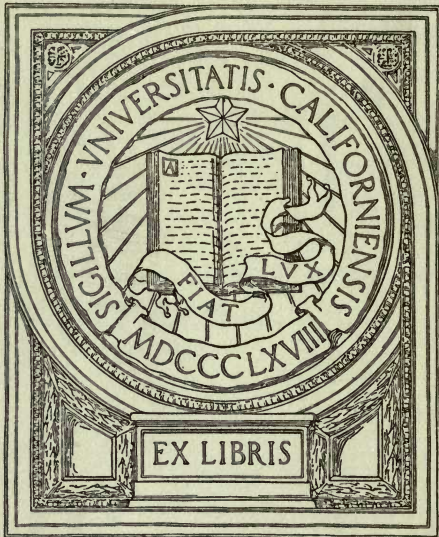


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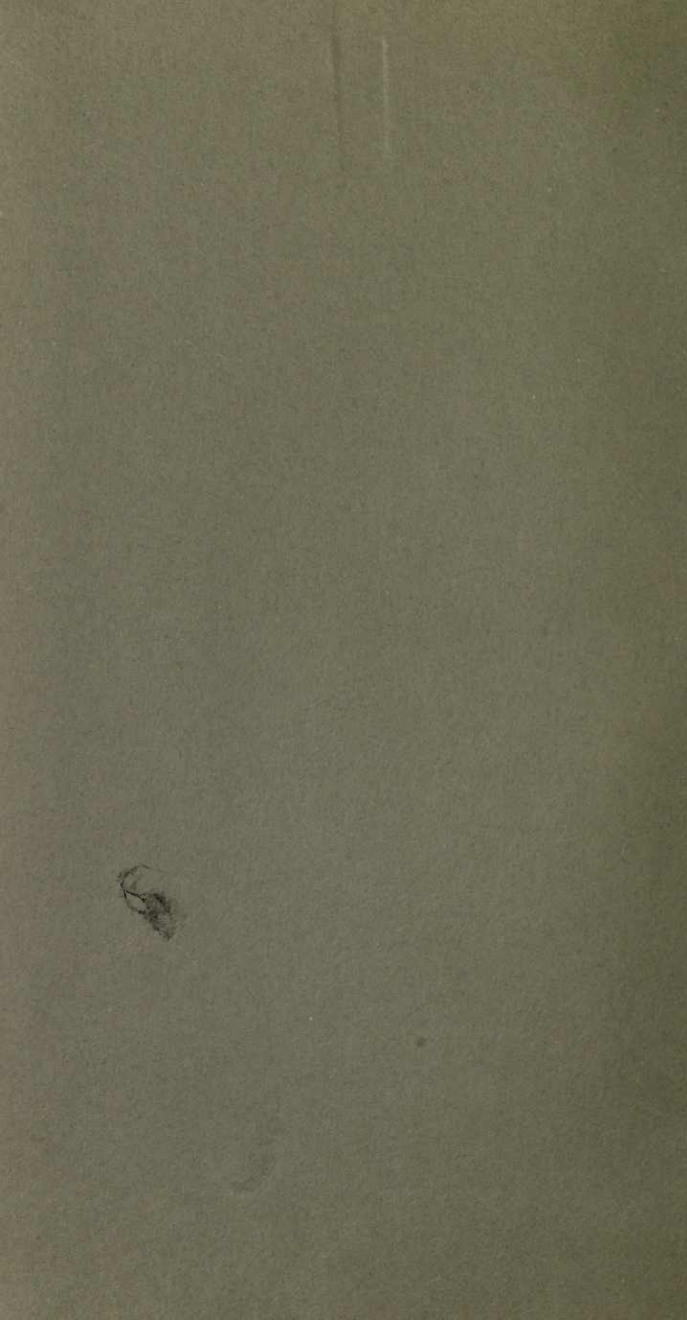
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FLORA

OF THE

PRESIDENCY OF MADRAS

J. S. GAMBLE

VOL. I.

*FOREWORD, PREFACE, AUTHOR'S NOTE, NOTES ON
PART XI, GENERAL DESCRIPTION, ABBREVIATIONS,
GLOSSARY AND KEY TO FAMILIES.*

FLORA: RANUNCULACEAE TO CAPRIFOLIACEAE.

PUBLISHED UNDER THE AUTHORITY OF THE
SECRETARY OF STATE FOR INDIA IN COUNCIL

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J. S. GAMBLE

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EXCHANGE
GENERAL DESCRIPTIONS, ABBREVIATIONS,
GLOSSARY AND KEY TO FAMILIES.
KEY: REFERENCE TO CAPRIFOLIACEAE.

PUBLISHED UNDER THE AUTHORITY OF THE
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FLORA

OF THE

RESIDENCY OF MADRAS

BY

J. S. GAMBLE

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PALANUKOTLA

PART I.

RANUNCULACEAE TO OPILIACEAE

PUBLISHED UNDER THE AUTHORITY OF THE
SECRETARY OF STATE FOR INDIA IN COUNCIL

LONDON

WEST, NEWMAN & CO.
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FOREWORD

WITH this last part of the 'Flora of the Presidency of Madras,' I should like to take the opportunity of thanking Mr. Fischer for the conscientious and thorough way in which he has completed my late husband's work, which was undertaken at the request of the Government of India in 1912.

Mr. Gamble told me that Mr. Fischer was the only man he knew who could carry on the work if he did not live to complete it himself. I am much gratified that my husband's wish has been so ably fulfilled.

I should also like to thank Sir Arthur Hill for his kind and valuable help in furthering the work.

GERTRUDE GAMBLE.

18, CUMBERLAND ROAD,

KEW,

SURREY;

August, 1935.

PREFACE

IN 1912 the late Mr. J. S. Gamble, C.I.E., F.R.S., was requested to undertake the preparation of a 'Flora of the Presidency of Madras,' a task for which he was remarkably well qualified owing to the exceptional knowledge of the Flora he had acquired during his long service in the Presidency as Conservator of Forests. During the course of his extensive and careful tours he made very complete collections of plants of the Presidency, and formed and maintained a very complete private Herbarium, which he subsequently presented to the Royal Botanic Gardens, Kew. Mr. Gamble retired from the Indian Forest Service in 1899, and at the time was fully occupied with the publication of his 'Materials for a Flora of the Malayan Peninsula'. The first part of the 'Flora of the Presidency of Madras' (*Ranunculaceae* to *Opiliaceae*), consisting of 200 pages, was published in November, 1915, and the draft of the botanical portion of about the first 132 pages was prepared by Mr. S. T. Dunn, as explained by Mr. Gamble in his introduction to this part, since Mr. Gamble had not at the time completed his Malayan work. The remainder of this part and the editing of the whole and the preparation of Parts II-VII inclusive was undertaken entirely by Mr. Gamble. Part II was published in 1918 and was followed by Part III in 1919, Parts IV, V, VI and VII in 1921, 1923, 1924 and 1925 respectively ; Part VII being published very shortly after Mr. Gamble's death on October 16th, 1925. The publication of this part carried the work to the end of the *Euphorbiaceae*. With the consent of the Government of India and of Mrs. Gamble, the completion of the 'Flora' was entrusted to Mr. C. E. C. Fischer, late of the Indian Forest Service, now Assistant for India, Royal Botanic Gardens, Kew, who had had many years of experience in the Madras Presidency, and thanks to his knowledge of the flora the work has now

been completed by the publication of Parts VIII-X in 1928, 1931 and 1934 respectively.

The choice of Mr. Fischer to complete the task has been a fortunate one, since not only has he had all the resources of the Kew Herbarium at his disposal, but he has received the same ready help from the botanists in India which was so freely given to Mr. Gamble.

The work has been completed on the lines laid down by Mr. Gamble, and though it is much to be regretted that he did not live to complete the 'Flora,' the change in authors has most fortunately very little affected the character of the work, and is a worthy memorial to the assiduous labours of a distinguished Indian botanist.

A. W. HILL.

Kew;

July, 1935.

AUTHOR'S NOTE

It has been a very real source of personal gratification to be allowed to complete the work left unfinished at the lamented death of Mr. J. S. Gamble, and this not so much as a botanist, but rather as a tribute to the memory of one for whom I have a sincere admiration and affection.

I have endeavoured to adhere as precisely to Mr. Gamble's scheme as lay in my power.

I have to acknowledge with thanks the assistance of several of my colleagues at the Kew Herbarium, but I alone must be charged with all the shortcomings. I must also gratefully acknowledge advice and help from my friends Mr. J. H. Burkill and the late Professor W. G. Craib. I am indebted to Mrs. Gamble, who proved unfailingly encouraging and patient, and to Sir Arthur Hill, K.C.M.G., F.R.S., for his kind support. Finally, I thank my wife for help in preparing the Indexes.

A very large number of botanical specimens have been examined and compared in connection with the flora; not only those in the Kew Herbarium, to which, during the progress of the work, Mr. Gamble's own herbarium and that from South India collected and presented by Sir A. G. and Lady Bourne were added, but also those among the large sets obtained on loan from the Superintendent of the Royal Botanic Gardens, Calcutta, the Principal of the Government Agricultural College at Coimbatore, and the Conservator of Forests, Travancore. Further, the Professors of Botany at Oxford, Cambridge and Edinburgh kindly placed the Indian specimens in their charge at the disposal of Mr. Gamble and myself. Through Mr. A. Meebold, the collection of Indian grasses he made from 1908 to 1912 were lent to me by the Director of the Breslau Museum. A number of the type-specimens of species described by Retzius from plants collected in S. India by F. G. Koenig were kindly sent on loan from the Lund Herbarium. Smaller, but

valuable, recent collections were received from Professor E. Barnes and the Botanical Assistant at the Government Museum, Madras, Mr. P. V. Mayuranathan. To all these thanks are due and here expressed.

It was Mr. Gamble's practice to publish explanatory notes in the 'Kew Bulletin' soon after the appearance of each part—a practice which the Editor has kindly permitted me to continue. These notes appeared as follows :

For Part I in 'Kew Bulletin,'	1916,	p. 57.
„ „ II „ „	1918,	p. 222.
„ „ III „ „	1920,	p. 49.
„ „ IV „ „	1921,	p. 312.
„ Parts V and VI in 'Kew Bulletin,'	1924,	p. 235.
„ Part VIII in 'Kew Bulletin,'	1928,	p. 281.
„ „ IX „ „	1931,	p. 257.
„ „ X „ „	1935,	p. 143.

Mr. Gamble appears to have made no observations for Part VII.

For Part XI the notes will be found on p. ix below.

It was intended that the map accompanying the final part should include every locality mentioned in the work, but a very few have been omitted as they could not be traced, and three or four to avoid further congestion on the map. Absolute accuracy is not claimed for every item indicated because many of the places cited are not recorded on any published map; their positions are sufficiently proximate, however, to make it easy to locate them *in situ*.

CECIL E. C. FISCHER.

ROYAL BOTANIC GARDENS,

Kew;

9th September, 1935.

NOTES ON PART XI

LYTHRACEAE.

ROOTALA FYSONI, Blatt. & Hallb. in J. B. N.H.S. xxv, 709, is, I consider, *R. illecebroides*, Koehne.

ONAGRACEAE.

In 'Kew Bull.', 1924, 236, Mr. Gamble drew attention to a paper by Mr. N. Ridley in 'Journ. Bot.', 1921, 257, in which it was shown that *Jussieuia suffruticosa*, Linn., as described in 'F. B. I.' ii. 587, comprises more than one species. Mr. Ridley further identifies the true *J. suffruticosa*, Linn., with *J. fissendocarpa*, Haines, of which one sheet from Malabar is in the Kew Herbarium. This latter sheet, which appears not to differ from Haines's specimens from Purneah, however, has been identified by Dr. Lewin, of Berlin, as *J. linifolia*, Vahl. After comparing the Malabar sheet with American specimens of the last-named species, I agree with Dr. Lewin's determination. It is not the *J. suffruticosa*, Linn., based on the description of "Karambu" in 'Hort. Malab.' ii., 55, t. 49. For the rest I agree with Mr. Ridley, and in the Addenda three species of *Jussieuia* have been added.

GRAMINEAE.

Too late for quoting in any part of the 'Flora,' I have seen a copy of 'Bombay Grasses' by Rev. E. Blatter and C. McCann, with illustrations by R. K. Bhide. The illustrations will greatly facilitate identification, and as many of the grasses are common to the two areas this work is mentioned here.

THELEPOGON ELEGANS, Roth. When dealing with the *Gramineae* in Part X, I had seen no specimen from the area included in the 'Flora,' but since then one collected in the northern part of the Hyderabad State has come to hand.

ANDROPOGON MICRANTHUS, Kunth. No specimen of this species was forthcoming until after the publication of Part X. One sheet from Horsleykonda has turned up, and the species has been included in the Addenda as *CAPILLIPEDIUM PARVIFLORUM*, Stapf.

EHRHARTA ABYSSINICA, Hochst. The genus **EHRHARTA** is mainly African; it has not been reported hitherto from India, and so does not find place in the 'F. B. I.' Since the publication of Part X of the present work, Mr. C. E. Hubbard had drawn my attention to a sheet of the species mentioned above collected not later than 1835 in the Nilgiri Hills by B. Schmid and now in the Kew Herbarium. On the label is a note, not in the collector's hand, suggesting that it is an introduction, but as the species occurs in the mountains of Abyssinia and also in E. Africa, it is not at all a likely plant to be introduced either intentionally or accidentally. Moreover, certain plants are known to be common to India and E. Africa. In spite, therefore, of the fact that no further specimens have been collected since B. Schmid's time, it seems to be the safest course to include this species in the Addenda. Unfortunately there is no mention of the precise locality where Schmid found it.

GENERAL DESCRIPTION OF THE FLORA

THE Presidency of Madras presents, probably, a more varied flora than any other tract of equal area in India, possibly in the world.

This phenomenon is due to the combined effects of its geographical situation and its topography.

A double coast line with the Indian Ocean on the West and the Bay of Bengal on the East, yet the two sufficiently distant from each other to allow of continental conditions in the interspace ; two main hill ranges of the Eastern and Western Gháts within the direct influence of these expanses of water and numerous other lesser connected and isolated hill masses ; considerable tracts of open plain or plateau land within the said heights ; elevations ranging from sea-level to almost 9,000 ft ; the proximity of the southernmost part to the Equator ; all these, with the climatic features they connote, are the factors which contribute to this variation.

The most interesting feature, and one that distinguishes it from that of the rest of the Indian Peninsula, is found in the dense, evergreen forests of the West and South with their wealth of sub-tropical species.

The flora falls into the 4th (Malabar) and 5th (Deccan) Provinces described by Sir Joseph Hooker in 1904 in his ' Sketch of the Flora of British India '. As there stated, the flora comprised upwards of 4,000 species of flowering plants. Since then a number of new species have been described, so that the total in the present work amounts to 4,516. This figure must not be accepted as final ; further botanical exploration is bound to yield more species new to botanical science, as indeed is indicated by the results of Professor E. Barnes's collections made during the past three years, as well as discoveries by others. This is particularly marked in the genus

Impatiens, to which Sir Joseph attributed about 50 species, whereas the present work includes 81.

It is interesting to compare the ten dominant families with similar lists drawn up by Sir Joseph Hooker, as follows :

Madras Presidency.		Position in list for—			
		All British India.	Western Peninsula.	Burma.	
1. <i>Leguminosae</i>	432 species	2	2	2	
2. <i>Gramineae</i>	388 „	3	1	3	
3. <i>Rubiaceae</i>	226 „	4	7	4	
4. <i>Acanthaceae</i>	202 „	6	3	6	
5 and { <i>Euphorbiaceae</i>	199 „	5	6	5	
6 { <i>Orchidaceae</i>	199 „	1	4	1	
7. <i>Compositae</i>	189 „	7	8	9	
8. <i>Cyperaceae</i>	172 „	8	5	7	
9. <i>Labiatae</i>	128 „	9	9
10. <i>Asclepiadaceae</i>	93 „	..	10
14. <i>Urticaceae</i>	76 „	10	..	8	
25. <i>Scitamineae</i>	40 „	10	

Geraniaceae with 92 species (including *Balsaminaceae*) comes close to *Asclepiadaceae*, and is likely to outstrip it in the future.

The number of Dicotyledons is slightly more than three times that of Monocotyledons, and there are only 5 indigenous Gymnosperms.

In spite of, perhaps because of, its numerous components it is difficult to split up the area into very well-defined regions, and still more to fix clear limits to them, although the typical characteristics of each are susceptible of differentiation. There is so much overlapping, intrusion and shading off from one to the next that only a minutely detailed description of each can give a clear idea ; an ecological study would involve the compilation of several volumes. Much the same would apply to the variations within each region due to the influence of elevation, atmospheric, topographic and phreatic moisture and to changes in soil. On the hills the flora peculiar to the higher slopes and plateaux may intrude into a lower and dryer region along the streams, and the more xerophytic species often climb upwards along exposed and eroded spurs. Unfortunately, detailed ecological investigation is lacking. The examination, in more or less detail, of one range of hills has shown that

within a few miles—certainly within fifteen miles—one may meet with a series of very distinct types, ranging from a semi-desertic through dry and moist deciduous hill forest, dense evergreen forest varying with elevation to the open grass lands and alpine flora of the higher peaks.

Subject to the limitations indicated, the Madras Presidency may be divided roughly into five main floristic regions as follows :

I. The *Sal Region* in the North ; comprising the district of Ganjam, and the hill tracts of the Agency of that district and of Vizagapatam and Godavary. As its title implies, the region is characterized by the more or less abundant presence of *Shorea robusta*, Gaertn., which species does not occur south of the Godavari River.

Apart from the presence of this and some other species of more northern tracts that appear on a few of the higher hills (Mahendragiri, Madgole, etc.), the region presents no very obvious line of cleavage from the next and the vast majority of their species are identical.

II. The *Dekkan Region*, comprising the Lower Godavari, Kistna, Guntur, Kurnool, Bellary, Anantapur, Cuddapah, Chittoor, Nellore, Chingleput and North and South Arcot districts and also parts of the Salem and Coimbatore districts.

The forest growth is mainly deciduous, and includes *Tectona grandis*, Linn., *Terminalia tomentosa*, W. & A., *Terminalia coriacea*, W. & A., *Anogeissus latifolia*, Wall., and numerous other trees of the more or less dry forest tracts. In some of the valleys evergreen trees of comparatively small size are found, *e. g.* *Memecylon edule*, Roxb., *Maba nigrescens*, Dalz., and *Gelonium lanceolatum*, Willd.

There are four endemic trees of interest that appear in one part of this region. These are *Pterocarpus santalinus*, Linn. f., *Terminalia pallida*, Brand., *Syzygium alternifolium*, Walp., and *Shorea Tumbaggia*, Roxb., which inhabit the Veligonda, Lankamallais, Pal-konda, Seshachalam and Kambakkam Hills of the Cuddapah, Nellore, Chittoor and Chingleput districts. The first three also occur in the southern outliers of the Nallamalais hills in the Kurnool and Cuddapa districts.

III. The *Semi Desert Region*, comprising the lower parts of the districts of Coimbatore, Salem, Trichinopoly, Madura and Tinnevely.

The rainfall is low, in most places under 18 in. per annum. The

flora is characterized by thorny small trees and shrubs with small leaves, such as *Dalbergia spinosa*, Roxb., *Dalbergia coromandelina*, Prain, and *Acacia planifrons*, W. & A.

IV. The *Wet Region*; comprising the coastal tracts and the Western Gháts in the districts of South Kanara, Malabar, Nilgiri, Coimbatore and Tinnevely, and the Native States of Cochin and Travancore, up to an elevation of about 6,000 feet.

The flora of this region is particularly diversified and rich, so that a number of sub-regions depending on elevation, aspect and latitude and on the resulting rainfall and temperature define themselves.

The characteristic species are *Hopea parviflora*, Bedd., *Vateria indica*, Linn., and *Xylia xylocarpa*, Taub. near the coast; the enormous growth of *Tectona grandis*, Linn., *Dalbergia latifolia*, Roxb., *Pterocarpus Marsupium*, Roxb., *Terminalia crenulata*, Roth., *Lagerstroemia lanceolata*, Wall., etc., in the moist deciduous forests further away from the coastline, and a host of evergreen species of *Guttiferae*, *Myrtaceae*, *Rubiaceae*, *Acanthaceae*, *Euphorbiaceae*, *Orchidaceae* and *Scitamineae* among others in the wet forests higher up the mountains. In the latter are found large tracts covered with a dense growth of the reed-like bamboo, *Ochlandra travancorica*, Benth., generally along streams, and also a great wealth of mosses and ferns, including several tree-ferns.

It is in this sub-region that occurs the only indigenous conifer, *Podocarpus latifolia*, Wall., and the two tree composites, *Vernonia monosis*, C. B. Clarke, and *V. travancorica*, Hook. f.

V. The *Alpine Region*; occupying the higher hills of the Nilgiri, Pulney and Anamalais ranges and the higher ranges of Travancore and Tinnevely above 6,000 ft.

This tract comprises open grass lands with small alpine plants and bushes. Among them may be cited *Parochetus communis*, Ham., *Hypericum mysorense*, DC., numerous species of *Impatiens*, *Oldenlandia*, *Anaphalis*, *Exacum*, *Sonerila grandiflora*, Wall., and many terrestrial orchids, *Arisaemas* and *Eriocaulons*.

The ravines usually shelter patches of evergreen trees (*sholas*), among which may be mentioned *Rhododendron nilagaricum*, Zenk., *Syzygium Arnottianum*, Walp., and other *Myrtaceae*, *Microtropis* spp., *Rapanea Wightiana*, Mez., *Elaeocarpus ferrugineus*, Wight, and

Daphniphyllum glaucescens, Bl. On the borders of these fragments of evergreen are found belts of *Strobilanthes Kunthianus*, T. And., *Gaultheria fragrantissima*, Wall., and *Rubus* spp.

As already indicated, within all the regions are a number of lesser distinctive features and some of these must be further mentioned.

Along both coasts in the deltas estuarine belts of mangroves occur, such as *Avicennia officinalis*, Linn., *Lumnitzera racemosa*, Willd., *Bruguiera* spp., *Rhizophora* spp. and of halophytic *Chenopodiaceae*.

On the dry foreshore sands the exotic *Casuarina equisetifolia*, Forst., has been planted extensively, but the natural flora consists of herbs and creeping shrubs such as *Hydrophylax maritima*, Linn. f., *Ipomea biloba*, Forst., *Sesamum prostratum*, Retz., and *Spinifex squarrosus* Linn.

A feature of the coastal tract in Region II is the shrubby and small tree growth of evergreen species that clothe the low-lying parts and the small hillocks within 20 miles or so of the sea. There may be a stratum of 3 to 6 ft. of wind-blown sand overlying better soil, or they may grow directly on the soil washed down from the higher hills. Characteristic species of these evergreens are : *Eugenia bracteata*, Roxb., *Memecylon umbellatum*, Burm. f., *Capparis brevispina*, DC., *Carallia integerrima*, DC., *Linociera malabarica*, Wall., and *Mimusops hexandra*, Roxb.

ABBREVIATIONS AND SIGNS

WORKS CITED AND ABBREVIATIONS USED.

- Acta Hort. Petrop.* : Acta horti Petropolitani.
Andr. Repos. : H. Andrew's Botanist's Repository.
Ann. Bot. : Annals of Botany.
Ann. Calc. : Annals of the Royal Botanic Garden, Calcutta.
Arn. Pug. : Pugillus plantarum Indiae orientalis, by G. Walker-Arnott.
Bedd. Fl. }
Bedd. Fl. Sylv. } Flora sylvatica, by R. H. Beddome.
Bedd. For. Man. : Forester's Manual of Botany, by R. H. Beddome.
Bedd. Ic. }
Bedd. Ic. Pl. Ind. Or. } Icones plantarum Indicae orientalis, by R. H.
Bedd. Ic. Pl. Or. } Beddome.
Benth. Fl. Aust. : Floraaustraliensis, by G. Bentham.
Bidie : Report on Neilgherry loranthaceous parasitical plants, by
 G. Bidie.
Bot. Cent.-Blatt. : Botanisches Centralblatt.
Bot. Mag. : Curtis's Botanical Magazine.
Bourd. For. Trees Trav. : The Forest Trees of Travancore, by T. F.
 Bourdillon.
Brand. For. Fl. : Illustrations of the Forest Flora of North-West and
 Central India, by D. Brandis.
Brandis Ind. Trees : Indian Trees, by D. Brandis.
Brand. Monog. : Das Pflanzenreich iv. 242—Symplocaceae.
Bull. Herb. Boiss. : Bulletin de l'herbier Boissier.
Bull. Jard. Bot. Buit. : Bulletin du jardin botanique de Buitenzorg.
Bull. Madr. Gov. Mus. : Bulletin of the Madras Government Museum.
Bull. Soc. Imp. Nat. Mosc. : Bulletin de la Société Imperiale des
 Naturalistes de Moscou.
Burm. f. Fl. Ind. : Flora indica, by N. L. Burmann.
Calc. Journ. Nat. Hist. : Calcutta Journal of Natural History.

- Clarke Comp. Ind.* : Compositae Indicae, by C. B. Clarke.
- Cogn. Monog.* : de Candolle's Monographiae phanerogamarum—Melastomaceae.
- Comm. Beng.* : Commelynaceae et Cyrtandraceae bengalensis, by C. B. Clarke.
- Contr. Gray Herb.* : Contributions to the Gray Herbarium.
- Cooke Bomb. Fl.* } Flora of the Presidency of Bombay, by T. Cooke.
- Cooke Fl. Bomb.* }
- Cor. Pl.* : Coromandel Plants, by W. Roxburgh.
- DC. Fl. Fr.* : Flore française, by A. P. de Candolle.
- DC. Monog.* : de Candolle's Monographiae phanerogamarum.
- DC. Prodr.* : A. de Candolle's Prodrômus systematis naturalis regni vegetabilis.
- D. Don Prodr. Fl. Nep.* } Prodrômus florae Nepalensis, by D. Don.
- Don Prodr.* }
- Denkschr. Akad. Wien.* Denkschriften der Mathematisch-Naturwissenschaftlichen Classe der Kaiserlichen Akademie der Wissenschaften, Wien.
- Desc. et Ic.* : Descriptionum et iconum novas plantas, by C. I. Rottboell.
- Engl. & Prantl. Naturl. Pflzm.* : Natürlichen Pflanzenfamilien.
- Engl. & Prantl. Naturl. Pfl. Nacht.* : „ „ Nachtrag.
- Engl. Jahrb.* : Engler's Botanische Jahrbücher.
- Engl. Pflanzenr.* } Das Pflanzenreich.
- Engl. Pflzreich.* }
- Enum. Pl. Zeyl.* : Enumeratio plantarum zeylanicae, by G. H. K. Thwaites.
- Enum. Subst. Braz.* : Enumeração das substancias brazileiras, etc., by Silva Manso.
- Exot. Bot.* : J. E. Smith's Exotic Botany.
- F. B. I.* : The Flora of British India.
- Fl. Cap.* : Flora capensis.
- Fl. Gang. Pl.* : Flora of the Upper Gangetic Plain, by J. F. Duthie.
- Fl. Madr.* : Flora of the Presidency of Madras.
- Fl. Nilg. & Puln.* : Flora of the Nilgiri and Pulney Hill-tops, by P. F. Fyson.
- Fl. N. Z.* : Handbook of the New Zealand Flora, by J. D. Hooker.
- Fl. Trop. Afr.* : Flora of Tropical Africa.
- Forsk. Fl. Aeg.-Ar.* : Flora Aegyptiaco-Arabica, by P. Forsskaal.
- F. R.* : Fedde's Repertorium specierum novarum regni vegetabilis.
- Gaertn. Fruct.* : De fructibus et seminibus plantarum, by J. Gaertner.
- Gard. Chron.* : The Gardener's Chronicle.

- G. Don. Gen. Syst.* : A General System of Gardening and Botany, by George Don.
- Hook. Bot. Misc.* : W. J. Hooker's Botanical Miscellany.
- Hook. Ic. Pl.* : J. D. Hooker's Icones plantarum.
- Hort. Mal.* }
Hort. Malab. } H. van Rheedee's Hortus Indicus Malabaricus.
- Ic. Pl.* : J. D. Hooker's Icones plantarum.
- Ind. For.* : The Indian Forester.
- Ind. For. Rec.* : Indian Forest Records.
- Interp. Rumph. Herb. Amb.* : An Interpretation of Rumphius's Herbarium Amboinense, by E. D. Merrill.
- Journ. As. Soc. Beng.* : Journal of the Asiatic Society of Bengal.
- Journ. Bomb. Nat. Hist. Soc.* : Journal of the Bombay Natural History Society.
- Journ. Bot.* : The Journal of Botany.
- Journ. Ind. Bot. Soc.* : Journal of the Indian Botanical Society.
- Journ. Linn. Soc.* : The Journal of the Linnean Society of London.
- Kew Bull.* : Bulletin of Miscellaneous Information, Royal Botanic Garden, Kew.
- Lamk. Encycl.* : Tableau encyclopédique et méthodique des trois règnes de la nature, by de la Mark.
- Linn. Mant.* : Mantissa plantarum, by C. von Linné.
- Madr. Journ.* : The Madras Journal of Literature and Science.
- Mez Monog. Myrs.* : Das Pflanzenreich IV—Myrsinaceae.
- Monog. Myrist.* : Monographie der Myristicaceen, by O. Warburg.
- Mus. Bot. Lugd. Bat.* : Museum botanicum Lugduno-Batavum, by C. L. Blume.
- Nilg. Hill. Fl.* : Flora of the Nilgiri and Pulney Hill-tops, by P. F. Fyson.
- Not. Bot. Gard. Edin.* : Notes from the Royal Botanic Garden, Edinburgh.
- Nov. Sp. Pl.* : Novae plantarum species, by A. G. Roth.
- O. Kze. Rev. Gen.* : Revisio generum plantarum, by O. Kuntze.
- Pflanzenr.* ; Das Pflanzenreich.
- Philipp. J. Sc.* }
Phil. Journ. Sc. } The Philippine Journal of Science.
- Phyt.* : Phytographia, by C. L. Willdenow.
- Planch. Monog. Vitaceae* : de Candolle's Monographiae phanerogamarum—Ampelideae.
- Pl. As. Rar.* : Plantae asiaticae rariores, by N. Wallich.
- Pl. Hohenack.* : F. A. W. Miquel's MS. identifications on Hohenacker's specimens.

- Pl. Ind. Coimb.* : Plantae indicæ qua in montibus coimbatoricis
coeruleis collegit B. Schmid, by J. C. Zenker.
- Rec. Bot. Surv. Ind.* : Records of the Botanical Survey of India.
- Rees Cycl.* : Cyclopaedia, by A. Rees.
- Royle Ill.* : Illustrations of the Botany of the Himalayan Mountains,
by J. F. Royle.
- S. I. G.* : Handbook of Some South Indian Grasses, by K. Ranga
Achariyar and C. Tadulinga Mudaliyar.
- S. I. H. S.* : Flora of the South Indian Hill-stations, by P. F. Fyson.
- Sim's Bot. Mag.* : Curtis's Botanical Magazine, vols. xv-liii.
- Syst. Laur.* : Systema laurinarum, by C. G. Nees.
- Talb. Bomb. List*
Talb. Trees and Shrubs, Bomb. } The Trees, Shrubs and Woody Climbers
of the Bombay Presidency, by W. A.
Talbot.
- Trans. Linn. Soc.* : Transactions of the Linnean Society of London.
- Trav. Trees* : The Forest Trees of Travancore, by T. F. Bourdillon.
- Trimen Fl. Ceyl.* : Handbook of the Flora of Ceylon, by H. Trimen.
- Wall. Cat.* : Catalogue of the Wallich Herbarium.
- W. & A.* : Prodromus floræ Peninsulae Indae orientalis, by R. Wight
and G. Walker-Arnott.
- Wt. Contrib.* : Contributions to the Botany of India, by R. Wight.
- Wt. Ic.* : Icones plantarum Indiae orientalis, by R. Wight.
- Wt. Ill.* : Illustrations of Indian Botany, by R. Wight.
- Wt. Spic. Neilgh.* : Spicilegium neilgherrense, by R. Wight.

OTHER ABBREVIATIONS.

- | | |
|------------------------------------|-------------------------------|
| <i>diam.</i> , diameter. | <i>n. sp.</i> , new species. |
| <i>fig.</i> , figure. | <i>n. var.</i> , new variety. |
| <i>ft.</i> , foot or feet. | <i>pl.</i> , plate. |
| <i>Hind.</i> , Hindi. | <i>subsp.</i> , subspecies. |
| <i>in.</i> , inch or inches. | <i>t.</i> , table. |
| <i>Kan.</i> , Kanarese. | <i>Tam.</i> , Tamil. |
| <i>Mal.</i> , Malayalam. | <i>Tel.</i> , Telugu. |
| <i>Mar.</i> , Marathi. | <i>Ur.</i> , Uriya. |
| <i>n. comb.</i> , new combination. | <i>Var.</i> , variety. |
| <i>Nilg.</i> , Nilgiri. | <i>Vern.</i> , vernacular. |

SIGNS.

- ♂ male ; ♀ female ; ♂ bisexual.

GLOSSARY OF BOTANICAL TERMS USED

ACCRESCENT : increasing in size with age.

ACCUMBENT : lying against.

ACHENE : a small, hard, dry, *indehiscent*, 1-seeded fruit ; in a strict sense of a single free *carpel*, but also used when more.

ACTINOMORPHIC : symmetrical in several planes.

ACUMINATE : tapering to an acute end.

-ADELPHOUS : of *stamens* united into one or more bundles.

ADNATE : attached by the whole length.

ADVENTITIOUS : arising irregularly and not in the normal order.

AESTIVATION : the manner in which the parts of a flower are arranged and folded before expansion.

ALBUMEN : the nutritive material stored within the seed outside the *embryo*.

ALGIFORM : resembling an alga.

ALVEOLA : a surface cavity.

AMPHITROPOUS : said of an *ovule* curved to bring its two ends near together.

AMPLEXICAUL : stem-clasping, as the bases of some leaves or *petioles*.

ANASTOMOSING : when veins meet and join to form a net.

ANATROPOUS : said of an *ovule* inverted on its *funicle* so that the opening is close to the *hilum* and the *chalaza* at the other end.

ANDROEICUM : the entire male parts of a flower.

ANDROGYNOUS : male and female flowers in the same *inflorescence*.

ANISOMEROUS : when the different series of a flower are unequal in number.

ANNULAR : in the form of a ring.

ANTHER : that part of the *stamen* which contains the *pollen*.

ANTHOCARP : a false-fruit formed by the fusion of the whole or a part of the flower with the fruit itself.

ANTICIOUS : the forepart, that most remote or turned away from the *axis*.

APICULA : a short, sharp, but not rigid point.

APOCARPUS : when the *carpels* are free and separate.

- AREOLE** : a space marked out in any way ; a small cell or cavity.
- ARIL** or **ARILLUS** : an appendage arising from the *hilum* and more or less enveloping the seed, as the mace of the nutmeg.
- ARISTA** : a bristle-like appendage, common in grasses.
- ARMED** : provided with spines or thorns.
- ARTICULATE** : jointed.
- ATTENUATE** : narrowed, tapered.
- AURICLE** : a small lobe ; an ear-shaped appendage.
- AWN** : a bristle-like appendage longer than an *arista*.
- AXIL** : the upper angle formed between the *axis* and any organ arising from it, as that between a stem and a leaf on it.
- AXILE** : belonging to the *axis*.
- AXILLARY** : situated in an *axil*.
- AXIS** : an imaginary line around which organs are developed ; any member which bears lateral subsidiary members.
- BACCATE** : berry-like.
- BARBELLATE** : provided with short, stiff hairs, especially if *retorse*.
- BEAK** : a narrowed, usually solid prolonged tip ; not used for leaves.
- BERRY** : a pulpy fruit with immersed seeds.
- BICONVEX** : convex on both sides.
- BRACT** : a modified, reduced leaf, usually on an inflorescence, often bearing a flower in its *axil*.
- BRACTEOLE** : a small bract, often on the *petiole* or immediately below or on the *calyx*.
- BULB** : a modified bud, usually underground and with fleshy scales or coats.
- BULBIL** : a small, usually axillary *bulb*.
- BULLATE** : puckered ; a surface with portions thrown out which are convex on one side and concave on the other.
- CADUCOUS** : falling off early.
- CAESPITOSE** : tufted, as many grasses.
- CALLUS** : an abnormally thickened part ; in grasses an extension of the flowering bract below its point of insertion adhering to the *axis* of the *spikelet*.
- CALYCINE** : herbaceous ; resembling a *calyx* in texture.
- CALYCVULUS** : a whorl of *bracts* outside the true *calyx*.
- CALYPTRA** : a cap-like covering of a flower.
- CALYX** : the outermost series of the parts of a flower ; also the enveloping parts of a flower with only one *perianth*-series.
- CAMPANULATE** : bell-shaped.

CAMPYLOTROPOUS : said of an *ovule* curved by unilateral growth so that the true apex is brought near the *hilum*.

CANCELLATE : latticed.

CANESCENT : becoming grey or hoary.

CAPILLARY : so slender as to be hair-like.

CAPSULE : a dry *dehiscent* fruit.

CARPEL : a single modified leaf forming an *ovary* or part of it and bearing the *ovules*.

CARPOPHORE : the *axis* of an *ovary* from which the ripe *carpels* eventually separate.

CARPOPHYLL : = *carpel*, but often used specially where the *carpel* is open and the *ovules* exposed.

CARTILAGINOUS : hard and tough, like the rind of an apple-pip.

CARUNCLE : protuberance or peculiar growth near the attachment of a seed.

CATAPHYLL : the early leaf-forms of a plant, usually without blades.

CATKIN : a *spike* consisting usually of unisexual flowers without *petals*, solitary or twin in the *axils* of *bracts*.

CAUDATE : with a tail-like tip.

CAUDEX : the *axis* of a plant consisting of stem and roots.

CAUDICLE : a small tail-like organ; in orchids the stalk of the *pollinium*.

CAULESCENT : having an obvious, though not large stem.

CAULINE : belonging to or arising from the stem.

CENTRIFUGAL : developing from the centre outwards.

CENTRIPETAL : developing from the outside towards the centre.

CHALAZA : that part of the *ovule* or seed where the nucleus is nearest the *integuments*.

CHARTACEOUS : papery.

CHLOROPHYLL : the green colouring matter of plants.

-CIDAL : a suffix denoting *dehiscence*; e. g. *loculicidal*, splitting down the middle of the *carpel*, and *septicidal*, splitting along the *septum*.

CILIA : a marginal hair.

CINERACEOUS : somewhat ashy in tint.

CINEREOUS : the grey of wood-ashes.

CINNAMOMEUS : the light yellowish-brown tint of cinnamon.

CIRCINNATE OR CIRCINATE : coiled.

CIRCUMSCISS : splitting as if cut around transversely.

CIRRHUS OR CIRRUS : a tendril.

CLADODE : a branch or single *internode* simulating a leaf.

CLADOPHYLL : a branch assuming the form and function of a leaf.

CLAVATE : club-shaped.

- CLAW : the narrowed base of an organ, especially of a *petal*.
- CLEISTOGAMOUS : flowers that are fertilized within the unopened *perianth*.
- COCCUS : one part of a *lobed* fruit becoming more or less detached from the rest and usually derived from a single *carpel*.
- COLLATERAL : placed side by side at the same level.
- COLUMELLA : a persistent axis around which the *carpels* of some fruits are arranged.
- COLUMN : the fusion of stamens or of stamens and styles into a solid body.
- COMA : the tuft of hairs at the end of some seeds ; the tuft of empty *bracts* at the summit of some *inflorescences*.
- COMMISSURE : the face of adherence of 2 *carpels*.
- COMPLICATE : folded lengthwise upon itself.
- COMPOUND : formed of similar parts grouped in a whole ; of leaves when composed of more than one separate leaflet.
- CONCOLOROUS : uniform in colour.
- CONDUPLICATE : folded together lengthwise.
- CONFERRUMINATE : adhering by adjacent faces.
- CONFLUENT : blended or merged into one.
- CONNATE : united to one another.
- CONNECTIVE : the portion of a *stamen* distinct from the *filament* which connects the *lobes* or cells of an *anther*.
- CONNIVENT : in contact or weakly cohering.
- CONTORTUPLICATE : twisted back upon itself.
- CONVOLUTE : rolled up from one or both margins.
- CORDATE : heart-shaped, *i. e.* more or less deeply notched at the base and in form like a conventional heart.
- CORIACEOUS : leathery.
- CORM : a bulb-like fleshy stem or base of a stem.
- CORNICULATE : bearing one or more little horns.
- COROLLA : the interior series of the *perianth*.
- COROLLINE : resembling *petals* in texture.
- CORONA : an inner appendage to the *corolla* shaped like a coronet, or a more or less interrupted outer appendage to the *stamens*.
- CORYMB : a form of *centripetal inflorescence* where the branches or *pedicels* arise at different levels but attain to nearly the same height to form a flat-topped or slightly domed cluster.
- COSTATE : ribbed.
- COTYLEDON : the leaf or pair of leaves present on the embryonic plant while still in the seed.
- CRENATE : scalloped or toothed with rounded teeth.

CRISTATE : crested.

CUCULATE : hood-shaped.

CULM : the stem, usually hollow, of grasses and bamboos.

CUNEATE : wedge-shaped.

CUPULE : a small cup.

CUSP : a sharp, usually rigid terminal point or *beak*.

CYMBIFORM : boat-shaped.

CYME : a *centrifugal inflorescence* in which the secondary or lateral branches continue to grow and may extend beyond the main *axis*.

CYSTOLITH : a mineral concretion in a cell of a leaf.

DECIDUOUS : falling off, not *persistent*.

DECLINATE : bent or curved downward or forward.

DECOMPOUND : repeatedly divided or branched or *compound*.

DECURRENT : prolonged downwards from the base.

DECUSSATE : in pairs alternately at right angles.

DEFINITE : not numerous, of *stamens* not exceeding 15.

DEHISCENT : splitting into definite parts.

DELTOID : shaped like an equilateral triangle.

DENTATE : sharply toothed, especially with teeth not pointing forward.

DICHASium : a *centrifugal inflorescence* in which all the *axes* end in flowers from below which lateral opposite branchlets arise.

DICHOTOMOUS : forked.

DICLINOUS : unisexual, the *stamens* and *pistil* in separate flowers.

DIDYMOUS : in equal pairs or connected halves.

DIDYNAMOUS : in two unequal pairs.

DIGITATE : spreading like the fingers of a hand ; in a compound leaf, when the leaflets are all borne at the apex of the *petiole*.

DIMIDIATE : one half wanting or rudimentary or apparently so.

DIMORPHOUS : occurring in two different forms.

DIOECIOUS : the two sexes segregated on different plants.

DISK or DISC : a development of the *torus* within the calyx and under or outside the *pistil*.

DISSEPIMENT : a partition in an *ovary* or *pericarp*.

DISTICHOUS : arranged in two vertical rows.

DIVARICATE : extremely divergent.

DORSAL : relating to the back ; the surface turned away from the *axis*.

DREPANIFORM : sickle-shaped.

DRUPE : a fruit with a more or less succulent flesh enclosing a single, 1-many-celled stone.

- ECHINATE : beset with prickles or spines.
- EFFUSE : loosely and widely spreading.
- ELLIPSOID : an elliptical solid body.
- EMARGINATE : rather deeply notched at the apex.
- EMBRYO : the incipient new plant within the seed.
- ENDOCARP : the inner layer of the wall of a fertilized *ovary* or a fruit.
- ENSIFORM : sword-shaped.
- EPICALYX : a whorl of bracts on or just below the *calyx* and more or less resembling it.
- EPICARP : the external layer of the wall of a fertilized *ovary* or a fruit.
- EPICHILE : the terminal part of the *lip* of an orchid flower when it is distinct from the *hypochile*.
- EPIGYNOUS : borne on the *ovary* or apparently so.
- EPIPHYTE : a plant growing on another.
- EQUABLE : even ; uniform.
- EQUITANT : folded over as if astride ; said of leaves when in vertical rows with the bases of the outer sheathing those of the inner.
- EROSE : eroded ; appearing torn or frayed at the edge.
- EXCURRENT : running out beyond the tip or margin.
- EXOCARP : the outer layer of a *pericarp*.
- EXOGENOUS : arising from the superficial tissues.
- EXTORSE : directed outwards ; often referring to the opening of anthers.
- FALCATE : sickle-shaped.
- FARIOUS : a suffix indicating parts, *e. g. bifarious*, in 2 parts ; *quadri-farious*, in 4 parts.
- FASCICLE : a close cluster or bundle.
- FASTIGIATE : with branches all clustered and erect.
- FENESTRATE : pierced with holes.
- FEROUS : a suffix meaning bearing, *e. g. floriferous*, bearing flowers.
- FERTILE : capable of producing fruit ; also used of *stamens* provided with pollen.
- FID : cleft ; *e. g. bifid*, 2-cleft.
- FILAMENT : the stalk of an *anther* ; any thread-like body.
- FILIFORM : thread-shaped.
- FIMBRIATE : fringed.
- FISTULAR : hollow throughout the length.
- FLABELLATE : fan-shaped.
- FLACCID : limp, flabby.
- FLAGELLUM : a whip-like appendage.

FLOCCOSE or FLOCCULENT : bearing or clothed with locks of soft hair or wool.

FOLIACEOUS : of the texture and shape of a leaf ; also leafy.

FOLLICLE : a fruit of one *carpel* opening by a *ventral suture* to which the seeds are attached.

FOVEA or FOVEOLA : a pit or depression.

-FRAGAL : a suffix indicating breaking or splitting.

FUCOID : resembling seaweed.

FUGACIOUS : soon perishing ; rapidly falling off.

FULVOUS : tawny.

FUNICLE : the stalk present in many *ovules* or seeds.

FURCATE : forked.

FURFURACEOUS : scurfy, covered with bran-like scales or powder.

FUSCOUS : dusky, greyish-brown.

FUSIFORM : spindle-shaped.

GALEATE : helmet-shaped.

GAMO- : a prefix indicating union, *e. g. gamopetalous*, *petals* united by their edges into one piece.

GEMINATE : in pairs.

GENICULATE : bent abruptly like a knee.

GIBBOUS : swollen on one side ; humped.

GLABROUS : without any kind of hairs.

GLABRESCENT : with deciduous hairs and becoming glabrous.

GLAUCOUS : sea-green or blue-green.

GLOCHIDIATE : bearing barbed bristles.

GLUMACEOUS : resembling the outer empty floral *bracts* of grasses.

GONOPHORE : an elongation of the *axis* of a flower bearing the *stamens* and *carpels*.

-GONOUS : a suffix indicating an angled body, *e. g. trigonous*, 3-angled.

GYNAECIUM : the entire female part of a flower.

GYNANDROUS : the *stamens* adnate to or borne on the *pistil*.

GYNOBASIC : applied to a style arising from the base of the *carpels*.

GYNOPHORE : an elongation of the *axis* forming a stalk to the *ovary*.

HASTATE : halberd-shaped ; with 2 acute basal *lobes* turned outwards.

HELICOID : coiled like a snake-shell ; applied to an inflorescence which is more or less coiled with all the flowers on one side.

HERMAPHRODITE : with the flowers bisexual.

HETEROGAMOUS : bearing 2 kinds of flowers sexually dissimilar.

HETEROGENEOUS : not uniform in kind.

HETEROMORPHOUS : not uniform in structure.

- HILUM** : the scar left on a seed at the former point of attachment.
- HIRSUTE** : bearing long tolerably distinct hairs.
- HISPID** : with rough or bristly hairs.
- HOMOGAMOUS** : bearing only one kind of flower.
- HOMOGENEOUS** : all of the same kind.
- HYALINE** : thin and transparent.
- HYGROSCOPIC** : apt to swell and expand on the application of water, and shrink on its removal.
- HYPOCARP** : an enlargement of the *pedicel* below the fruit.
- HYPOCHILE** : the basal portion of the *lip* in an orchid flower.
- HYPOCRATERIFORM** : salver-shaped.
- HYPOGYNOUS** : free from but inserted below the *pistil*.
- IMBRICATE** : overlapping like the tiles on a roof.
- IMPARIPINNATE** : *pinnate* with an odd terminal member.
- IMPERFECT** : where certain parts usually present are not developed, *e. g.* when one sex is absent in a flower.
- INCUMBENT** : resting or leaning upon.
- INDEFINITE** : too many for easy enumeration, of *stamens* when exceeding 15.
- INDUMENTUM** : a covering, such as of hairs.
- INDUPLICATE** : with the edges folded inwards.
- INDURATED** : hardened.
- INFLORESCENCE** : the disposition of the flowers on the floral *axis*; the flower clusters as a whole.
- INFUNDIBULAR** : funnel-shaped.
- INNOVATION** : a new-formed shoot.
- INTEGUMENT** : the covering of an organ or body.
- INTERCALATED** : interposed.
- INTERNODE** : the portion of an *axis* between two adjacent *nodes*.
- INTERPETIOLAR** : between two opposite petioles.
- INTRAPETIOLAR** : within the petiole, or between it and the stem.
- INTROSE** : directed inwards, usually referring to the opening of *anthers*.
- INVOLUCEL** : an inner wrapping.
- INVOLUCRE** : a ring of free or more or less united *bracts* surrounding several, rarely 1, flowers or their supports.
- INVOLUTE** : rolled in from both margins so that the upper side is within.
- IRREGULAR** : symmetric only on either side of a median plane.
- ISOMEROUS** : having the members of successive series in equal numbers.
- KEEL** : a ridge like the keel of a boat.

LABIATE : lipped, *i. e.* divided at the apex to shape like lips, usually 2.

LACINIATE : irregularly cut into narrow lobes.

LACUNOSE : a surface covered with depressions, or perforated with holes.

LAMELLA : a thin plate.

LAMINA : the blade of a leaf.

LANATE : clothed with woolly and intergrown hairs.

LANCEOLATE : shaped like a lance-head.

LEGUME : a 1-celled, 2-valved, *dehiscent* fruit.

LENTICEL : *lenticular* corky spots on young bark.

LENTICULAR : shaped like a biconvex lens.

LEPIDOTE : beset with small scurfy scales.

LIGNIFIED : converted into wood.

LIGULE : a strap-shaped organ ; in grasses and some sedges a narrow transverse appendage at the base of the leaf within.

LINEAR : several times longer than wide.

LINEOLATE : marked with fine or obscure lines.

LIP : one of the sections of a lipped organ ; in orchids the third petal, which is usually enlarged and dissimilar to the others ; also used in other flowers for a petal distinct in form from the others.

LOBE : any division of an organ, or specially a rounded division or projection.

LOCULE : a cell.

LOMENTUM : a legume contracted between the seeds and falling apart when mature at the constriction between the seeds.

LORATE : strap-shaped.

LUNATE : crescent- or halfmoon-shaped.

LYRATE : *pinnatifid* with the terminal lobe large and rounded and the lower lobes small.

MACROPODAL : long-footed or long-stalked.

MARCESCENT : remaining attached after withering.

MERICARP : a portion of a fruit which splits away and simulates a perfect fruit.

-MEROUS : a suffix used in combination to indicate the number of the parts, *e. g.* *trimerous* in threes.

MESOCARP : the middle layer of a *pericarp*.

MITRIFORM : mitre-shaped.

MONILIFORM : resembling a string of beads.

MONOECIOUS : with the male and female parts in different flowers but on the same individual plant.

MUCOUS : slimy.

MUCRO : a short sharp terminal excrescence, rather longer than an *apicula* but shorter than a *cuspid*.

MURICATE : rough with short, hard, tubercular excrescences.

MUTICOUS : blunt ; without any apical excrescence.

-NATE : a suffix used in combination to indicate the number of parts, *e. g. binate*, in pairs ; *ternate*, in threes.

NECTARY : an organ in which nectar is excreted ; sometimes applied to any anomalous part of a flower, such as a *spurred* petal.

NODE : the part of an axis whence a secondary member or whorl of members arises.

NODOSE : knotty or knobby.

NUT : a hard, dry, *indehiscent* 1-seeded fruit ; often also applied to a similar single part of a several-celled fruit.

OB- : used as a prefix inverts the term affixed.

OBLATE : spherical but flattened at the poles.

OCHREA or OCREA : a tubular *stipule* or pair of combined *stipules*.

-OID : a suffix indicating similarity to the term prefixed, *e. g. petaloid*, resembling *petals*.

OLIVACEOUS : olive-coloured.

OPERCULUM : a lip or cover which separates by transverse *dehiscence*.

ORBICULAR : circular in outline.

ORTHOTROPOUS : an ovule with a straight *axis*, the *chalaza* close to the *hilum* and the orifice at the opposite end.

OVARY : that part of the *pistil* which contains the *ovules*.

OVATE : egg-shaped.

OVULE : the incipient seed before fertilization.

PALATE : the prominent lower *lip* of certain *corollas* ; the throat of some 2-lipped *corollas*.

PALEA : chaffy or *hyaline* scale present in the *inflorescence* of some plants.

PALMATE : diverging like the widely spreading fingers of a hand.

PANDURIFORM : fiddle-shaped.

PANICLE : a repeatedly branched *inflorescence*.

PAPILLA : a soft superficial protuberance or gland.

PAPPUS : various tufts of hairs on some achenes or fruits, specially the scaly, bristly, hairy or feathery modified *calyx* in the *Compositae*.

PARIETAL : borne on the wall.

LABIATE : lipped, *i. e.* divided at the apex to shape like lips, usually 2.

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PALATE : the prominent lower *lip* of certain *corollas* ; the throat of some 2-lipped *corollas*.

PALEA : chaffy or *hyaline* scale present in the *inflorescence* of some plants.

PALMATE : diverging like the widely spreading fingers of a hand.

PANDURIFORM : fiddle-shaped.

PANICLE : a repeatedly branched *inflorescence*.

PAPILLA : a soft superficial protuberance or gland.

PAPPUS : various tufts of hairs on some achenes or fruits, specially the scaly, bristly, hairy or feathery modified *calyx* in the *Compositae*.

PARIETAL : borne on the wall.

- PARIPINNATE : *pinnate* with an equal number of members on each side of the axis and no odd terminal one.
- PARTITE : a suffix denoting division deeper than to the middle.
- PATENT : spreading.
- PECTINATE : *pinnately* cut in narrow segments set close like the teeth of a comb.
- PEDATE : *palmately* divided with the lateral divisions 2-cleft.
- PEDICEL : the stalk of a single flower.
- PEDUNCLE : the common stalk of 2-many flowers or of a complete inflorescence.
- PELTATE : shield-shaped ; said of leaves of which the *petiole* is attached to the lower surface of the blade and not at the margin.
- PENICILLATE : shaped like an artist's brush, with a terminal tuft of hairs.
- PENNATE : with members or incisions more or less regularly placed on either side of the median line, resembling the arrangement in a feather.
- PERFECT : an organ or a flower in which all the normal parts are present.
- PERGAMENTACEOUS : parchment-like.
- PERIANTH : the flower envelopes of 1 or 2 series, *i. e.* *calyx* and *corolla* ; more commonly used when the two series are not differentiated or when only one of them is present.
- PERICARP : the wall of a fertilized *ovary* ; sometimes improperly used for the protective husks of a fruit.
- PERIGYNOUS : said of the floral parts other than the pistil when they are inserted above the level of the base of the *ovary*, but not above the *ovary*.
- PERISPERM : the nutritive tissue outside the *embryo* sac which remains in the seed until absorbed ; sometimes the *pericarp* or even the *integuments* of a seed.
- PERSISTENT : remaining attached until the part bearing it is wholly matured.
- PERULATE : furnished with protective scales.
- PETAL : a single member of the *corolla*.
- PETIOLE : the stalk of a leaf.
- PHYLLODE : a *petiole* assuming the form and function of a leaf.
- PILOSE : hairy with rather long, soft, distinct hairs.
- PINNATE : organs or leaflets arranged on each side of a common *axis* as in a feather.
- PISIFORM : pea-shaped.
- PISTIL : the complete female part of a flower.

- PISTILLODE** : a rudimentary *pistil*.
- PLACENTA** : the part of the *ovary* that bears the *ovules*.
- PLANO-CONVEX** : flat on one side and convex on the other.
- PLICATE** : folded into plaits, usually lengthwise.
- PLUMOSE** : feathery or feathered.
- PLUMULE** : the primary leaf-bud of an *embryo*.
- POLLEN** : the fertilizing powdery, granular or waxy bodies produced in the *anthers*.
- POLLINIA** : a *pollen* mass, specially in orchids.
- POLLINIFEROUS** : bearing or containing *pollen*.
- POLY-** : a prefix indicating the presence of many of the affixed objects.
- POLYGAMOUS** : with both bisexual and unisexual flowers on the same or on different individual plants.
- POSTICOUS** : on the back-part ; next to the *axis*.
- PREMORSE** : as though bitten off, *i. e.* the end *truncated* and more or less irregular.
- PROCUMBENT** : lying along the ground.
- PROLIFEROUS** : bearing progeny as offshoots.
- PRUINOSE** : with a waxy-powdery secretion ; bloom.
- PUBERULOUS** : slightly hairy with very short hairs.
- PUBESCENT** : clothed with soft, rather short hairs or down.
- PULVINUS** : an enlargement close to the insertion of a leaf or the swollen base of the *petiole*.
- PUNCTATE** : marked with dots, depressions or glands.
- PUNGENT** : ending in a rigid and sharp point ; a sharp taste or smell.
- PUSTULATE** : pimply ; as though blistered.
- PUTAMEN** : the shell of a nut ; the hardened *endocarp* of a stone-fruit.
- PYRENE** : a nutlet ; one of the small stones of a drupe or similar fruit.
- PYRIFORM** : pear-shaped.
- QUADRATE** : squared.
- RACEME** : a *centripetal* inflorescence with lengthened *axis* and equally *pedicellate* flowers.
- RADIANT** : when the flowers on the outer rim of an *umbel* are larger than the inner.
- RADICAL** : arising from the root or its crown.
- RADICLE** : the rudimentary root of the *embryo*.
- RAMULUS** : branchlet.
- RAPHE** : the ridge formed by the adherent *funicle* along the side of some *ovules*.
- RAPHIDES** or **RHAPHIDES** : needle-shaped crystals in the cells.

RECEPTACLE : that part of the *axis* that bears one or more organs or flowers.

REGULAR : symmetrical in several planes.

RENIFORM : kidney-shaped.

REPAND : with wavy margin, but less so than if *sinuate*.

REPLICATE : folded down so that the upper part comes against the lower.

RESUPINATE : upside down or appearing so.

RETICULATE : resembling network.

RETINACULUM : the horny curved *funicle* of many *Acanthaceae*.

RETORSE : directed backwards or downwards.

RETUSE : a shallow notch in a rounded apex.

REVOLUTE : rolled back from the margins or apex so that the upper face is outside.

RHACHEOLA OR RHACHILLA : a secondary *axis* in the inflorescence of grasses.

RHACHIS OR RACHIS : the *axis* of an *inflorescence* or of a *compound leaf*.

RHIZOME : an underground stem, usually horizontal and elongated.

ROSTELLUM : a small beak ; a narrow extension of the upper edge of the *stigma* in some orchids.

ROSTRATE : beaked with slender tip.

ROSULATE : with clustered leaves collected into a rosette.

ROTATE : wheel-shaped ; said of a *gamopetalous corolla* with a short tube and spreading limb.

RUFIOUS : reddish.

RUGOSE : thrown into wrinkles.

RUMINATE : said of a seed with the *testa* projected as points and plates into the *albumen*.

RUNCINATE : incised with the teeth or *lobes* directed backwards.

SACCATE : bag-shaped.

SAGITTATE : arrow-head-shaped with the base enlarged into two straight, acute lobes.

SAMARA : an *indehiscent* winged fruit, or winged parts of a dehiscing fruit.

SAPROPHYTIC : feeding on decayed organic matter, such as humus.

SARMENTOSE : producing long and lithe runners.

SCABRID : covered with small hard hairs or points and feeling rough.

SCABROUS : very *scabrid*.

SCANDENT : climbing.

SCAPE : a leafless, or at most 1-leaved, floral *axis* or *peduncle* arising directly from the root.

- SCAPIGEROUS : scape-bearing.
- SCARIOUS : thin, dry and membranous, not green.
- SCORPIOID : said of an *inflorescence* with flowers in 2 ranks and the *axis* coiled like the tail of a scorpion.
- SCROBICULATE : pitted.
- SECT : suffix used to denote division of an organ to its base or nearly so into the number of parts stated by the prefix.
- SECUND : with the parts or members all directed to one side.
- SEPAL : a single member of the *calyx*.
- SEPTUM : any kind of interior wall or partition.
- SERRATE : with forward-pointing, sharp marginal teeth.
- SESSILE : without stalk.
- SESTA : a bristle or long, stiff, needle-like hair.
- SIGMOID : doubly curved in opposite directions, like the letter S.
- SILIQUA : a fruit with two valves falling away from a frame on which the seeds are attached and across which a false partition is formed.
- SINUATE : with a deeply wavy margin.
- SINUS : a recess or re-entering angle.
- SPADIX : a flower *spike* with a fleshy *axis*.
- SPATHE : a more or less modified *bract* enclosing or subtending a flower-cluster or complete *inflorescence*.
- SPATHEOLE : a small secondary spathe on a partial *inflorescence*.
- SPATHULATE : narrowly oblong with the end expanded and broader, more or less like a chemist's spatula.
- SPHACELLATE : dark and withered, as though dead.
- SPICIFORM : *spike*-like.
- SPICULE : a diminutive or secondary *spike*.
- SPIKE : an *inflorescence* with *sessile* flowers on a usually elongate *axis*.
- SPIKELET : a cluster of 1 or more flowers each in the *axil* of one or a pair of *bracts* and subtended by 2, rarely 1, empty *bracts*.
- SPINULOSE : bearing small spines.
- SPUR : a hollow, or sometimes solid, extension of some part of a flower.
- SQUARROSE : with numerous spreading and outstanding processes.
- STAMEN : the floral organ bearing the *anther* and *pollen*.
- STAMINODE : a sterile or abortive *stamen* without pollen.
- STELLATE : with its parts radiating like the points of a conventional star.
- STERILE : barren ; devoid of one or other of the sexual parts.
- STIGMA : that part of the *pistil* which receives the *pollen*.
- STIPE : the stalk or support of an *ovary* or *carpel*.
- STIPELLA : the *stipule* of a leaflet.

STIPITATE : stalked.

STIPULE : one of a pair of appendages borne on each side of the base of the leaves or *petioles* of many plants.

STOLON : a sucker ; any basal branch that is disposed to form roots.

STOMA : an aperture in the epidermis of young branches.

STRAMINEOUS : straw-coloured.

STRIATE : marked with longitudinal, parallel fine lines.

STRIGOSE : beset with sharp-pointed, appressed, straight, stiff hairs.

STROBILATE : resembling the cone of conifers ; an *inflorescence* largely made up of *imbricating* scales.

STROPHIOLE : an appendage to the *hilum* of some seeds.

STYLE : that part of the *pistil* between the *carpel* and the *stigma*.

STYLOPOD : an enlargement at the base of some styles.

SUB- : a prefix implying an approach to the condition indicated by the suffix without quite attaining to it ; also giving the sense of subordinate to.

SUBULATE : awl-shaped ; slender, terete and tapering to a sharp tip.

SUCCULENT : soft and juicy.

SULCATE : grooved or furrowed.

SUTURE : a junction or seam of union ; line of opening.

SYNDANDRIUM : where the *stamens* are united throughout.

SYNCARPIUM : a multiple or fleshy aggregate fruit.

SYNCARPOUS : composed of 2 or more united *carpels*.

TABESCENT : wasting or shrivelling.

TEGMEN : the inner coat of a seed.

TEPAL : a division of a *perianth*, usually employed when there is no distinction between the 2 series ; one of the 2 unchanged *petals* of orchids.

TERETE : cylindrical and circular in cross-section.

TESSELLATE : chequered.

TESTA : the outer coat of a seed.

THALLUS : a vegetative body without differentiation into stem and leaf ; the organ of attachment of some *Podostemonaceae*.

THECOUS : celled.

THYRSE : a close *panicle*, more or less spindle-shaped or *ovate*.

TIGELLUS : a miniature or initial stem.

TOMENTOSE : densely matted with woolly hairs.

TORULOSE : more or less cylindric but with alternate swellings and constrictions.

TORUS : that portion of the *axis* of a flower on which its parts are inserted.

TRABECULATE : cross-barred.

TRANSLUCENT : allowing light to pass through.

TRICHOTOMOUS : an axis successively 3-forked.

TRIGONOUS : 3-angled.

TRIQUETROUS : 3-edged with salient angles.

TRUNCATE : as though cut off at the end.

TUBER : a short, thickened subterranean branch beset with buds ;
the swollen end of a root attached to the upper end of a rootstock.

TUMID : inflated, swollen.

TURBINATE : top-shaped.

TURGID : swollen, but not with air.

UMBEL : an *inflorescence* in which a cluster of *pedicels* springs from the same point.

UMBILICUS : a *vascular* strand by which some seeds are attached.

UMBONATE : embossed in the centre.

UNCINATE : hooked.

UNGUICULATE : contracted at the base into a *claw*.

URCEOLATE : urn- or pitcher-shaped.

UTRICLE : a membranous sac, or a bladder-like appendage.

VAGINATE : sheathed or sheathing.

VALVATE : opening by valves ; or the several parts of an organ which meet exactly without overlap.

VASCULAR : relating to or furnished with vessels.

VENOSE : having veins.

VENTRAL : the front side, the side towards the *axis*.

VENTRICOSE : bellied ; swollen or inflated on one side.

VERMICULIFORM : shaped like a small worm.

VERMIFORM : worm-shaped.

VERRUCOSE : warty.

VERSATILE : turning freely on its support ; said of *anthers* attached above the base and swinging freely on the acute tip of the *filament*.

VERTICILLATE OR VERTICELLATE : arranged in a ring around an *axis*.

VEXILLARY : pertaining to the *vexillum*, the more or less modified anterior or posterior *petal* of some flowers.

VILLOUS : shaggy with long, weak hairs.

VISCID OR VISCOUS : sticky or clammy owing to an exudation.

VIVIPAROUS : germinating or sprouting from seed or bud while still attached to the parent plant.

ZYGOMORPHIC : symmetrical on either side of a median plane only.

ARTIFICIAL KEY TO THE FAMILIES

N.B.—*This Key has been adapted mainly from that in Sir D. Prain's 'Bengal Plants,' with the author's kind permission. The necessary modifications make it applicable only to the present flora. Dr. J. Hutchinson's 'Families of Flowering Plants' has also been of help.*

Ovules naked, not enclosed but borne on an open carpel, devoid of stigma. Wood usually with no true vessels (except in *Gnetaceae*); cotyledons 2—many; flowers always 1-sexual (*Gymnospermae*):—

Large climbers; leaves simple; flowers monoecious, whorled in the axils of bracts on solitary or paniced spikes; perianth present

CXLIII. GNETACEAE.

Trees or shrubs; flowers in cones or quasi cones; perianth 0:—

Leaves simple, scale-like, needle-like or flat and lanceolate, up to 8 in. longCXLIV. CONIFERAE.

Leaves pinnate, resembling palm leaves, 3–9 ft. long; petioles more or less spinyCXLV. CYCADACEAE.

Ovules enclosed in the carpels, crowned by a style and stigma. Wood, when present, consisting of true vessels; cotyledons 1–2 (*ANGIOSPERMAE*):—

Stem with a central pith surrounded by one or more concentric rings of woody vascular tissue enclosed in a separable bark; leaves usually articulated on the stem and usually with branched or reticulated veins; cotyledons usually 2, opposite, the young stem arising between them (*Dicotyledones*):—

Calyx and corolla usually both present; flowers mostly bisexual (*Dichlamydeae*):—

Petals usually free; stamens often numerous (*Polypetalae*):—

Stamens hypogynous, arising apart from the calyx direct from the receptacle or from a disk crowning the pedicel; segments of calyx usually free (*Thalamiflorae*):—

Sepals usually imbricate in bud; if valvate, then sepals free, leaves opposite, stamens many and fruitlets separate; or with paripinnate leaves and arillate seeds:—

Sepals usually free; if united below, then the petals dissimilar (*Resedaceae*); or leaves opposite and simple or imparipinnate; or leaves alternate and paripinnate:—

Stamens more than 12; if fewer, then sepals 4 and petals 4 with a 2-valved capsule or a berried fruit on a long gynophore; or sepals 2 with a central placenta; or the stamens attached to the base of the petals:—

Sepals 2–3, deciduous:—

Petals more or less like the sepals, in 2—many more or less distinct 3-nate whorls; carpels many in several whorls; trees, shrubs or climbers

III. MAGNOLIACEAE.

Petals coloured, unlike the green sepals; herbs:—

Sepals 2 and petals 4, or sepals 3 and petals 6; placentas parietal. Leaves alternate, more or less lobed or cut; sap milky or yellow

VIII. PAPAVERACEAE.

Sepals 2, petals 4–5; placentas free-central.

Leaves opposite or alternate, entire, sometimes terete; sap watery

XVIII. PORTULACACEAE.

Sepals 4 or more; if 2–3, then trees with opposite or 3-nate, leathery leaves and resinous juice:—

Petals many in several whorls or in a continuous spiral with the sepals; aquatic plants with submerged rootstockVII. NYMPHAEACEAE.

Petals usually 4–5, rarely 6–12, in 1, rarely 2 whorls; or if petals many then terrestrial climbers with the petals like staminodes and with opposite cirriferous leaves:—

Petals all similar and entire:—

Sepals deciduous:—

Carpels quite free when ripe; ovule 1, ascending or pendulous

I. RANUNCULACEAE.

Carpels cohering in a 1-locular ovary with parietal or intruded placentas; ovules 2—many:—

Herbs; or if shrubs or trees, then with ovary and fruit borne on a long gynophore; sepals 4 ...XI. CAPPARIDACEAE.

Trees or shrubs with sessile ovary and fruit; sepals usually 5, sometimes 3-8

XIV. BIXACEAE.

Sepals persistent :—

Leaves alternate :—

Stamens quite free from the petals :—

Carpels 1-many, distinct or cohering in the axis of the flower; disk 0; styles quite free ...II. DILLENIACEAE.

Carpels united into a superior deeply 3-10-lobed and -celled ovary embedded in a lobed disk; styles connate

XXXVI. OCHNACEAE.

Stamens attached to the bases of and deciduous with the petals

XXIII. TERNSTROEMACEAE.

Leaves opposite, sometimes whorled :—

Herbs or shrubs without resinous juice; leaves herbaceous, gland-dotted; flowers bisexual, 5-merous

XXI. HYPERICACEAE.

Trees with resinous juice; leaves coriaceous, not gland-dotted; flowers usually 1-sexual or polygamous, usually 4-merousXXII. GUTTIFERAE.

Anterior petals palmately lobed, posterior narrow entire; ovary 1-celled, 2-6-lobed at the apex; small herbsXII. RESEDACEAE.

Stamens 10 or fewer :—

Flowers usually 3-merous; if 2-merous, then 1-sexual; carpels solitary or free; stamens 6, free, equal, opposite the petals; leaves alternate :—

Dioecious, scandent herbs or shrubs; flowers very small; anthers dehiscing by slits; carpels 3; seeds usually reniform or horseshoe-shaped

V. MENISPERMACEAE.

Bisexual, erect shrubs; flowers patent, carpel 1; anthers sensitive, dehiscing by valves

VI. BERBERIDACEAE.

Flowers 4-5-merous (sepals 2 in *Fumariaceae*) :—

Petals 4; stamens 6 :—

Sepals 2; petals 4 in 2 dissimilar pairs; stamens

in 2 bundles of 3 united; fruit without partitionIX. FUMARIACEAE.

Sepals 4; petals 4, uniform; stamens in 2 rows, free, filaments of inner 4 long, of outer 2 shorter; fruit with an internal partition

X. CRUCIFERAE.

Petals usually 5, sometimes 4, rarely 2-3; perfect stamens as many as or twice as many as the sepals and petals, rarely fewer, never 6:—

Ovary 1-celled; sepals usually persistent:—

Leaves developed, flat, never scale-like:—

Stamens as many as the sepals; placentas parietal:—

Leaves stipulate; ovary 1-celled; sap not pungent; herbs with irregular corolla or trees with regular corolla

XIII. VIOLACEAE.

Leaves exstipulate; ovary incompletely 2-3-celled; sap pungent; trees

XV. PITTOSPORACEAE.

Stamens twice as many as the sepals; placenta free-central; herbs

XVII. CARYOPHYLLACEAE.

Leaves minute, scale-like; shrubs

XIX. TAMARICACEAE.

Ovary 2- or more-celled; or if 1-celled, then distinctly stipitate:—

Filaments of anthers free; or if united at the base (some *Geraniaceae*), then with compound or deeply palmately lobed leaves:—

Leaves stipulate:—

Seeds many, attached to the inner angles of the cells; flowers regular; carpels as many as the sepals; small herbs with simple, opposite leaves

XX. ELATINACEAE.

Seed 1 in each cell, less often 2; if more than 2 and attached to the inner angles of the cells, then flowers irregular or leaves compound:—

Seeds pendulous:—

Leaves compound, opposite ;
stamens always 10, quite free

XXXII. ZYGOPHYLLACEAE.

Leaves simple ; or if compound,
then alternate ; stamens usually
5, filaments often united at the
base ; anthers sometimes cohering ;
flowers often irregular

XXXIII. GERANIACEAE.

Seeds erect :—

Leaves imparipinnate ; fruit a
berry ..XLVIII. STAPHYLEACEAE.

Leaves simple ; fruit of 2 winged
carpelsXLIX. ACERACEAE.

Leaves exstipulate ; flowers often zygo-
morphic ; stamens usually 8, inserted
inside the disk or between it and the
ovary, rarely outside ..L. SAPINDACEAE.

Filaments of anthers more or less united ;
leaves simple, alternate ; seeds pendulous :—

Flowers irregular ; sepals 5, unequal ;
petals usually 3, or if 4-5, then keeled ;
stamens usually 8 ; if fewer, then anthers
opening by pores, all or all but 2 united
into a sheath attached to the base of the
petals ; ovary 1-3-celled ; style single

XVI. POLYGALACEAE.

Flowers regular ; sepals 4-5, equal ; petals
4-5 ; stamens 5 or 10, filaments united
below, free from the petals ; anthers
opening by slits ; ovary 3-5-celled ; styles
3-5, free or more or less connate

XXX. LINACEAE.

Sepals more or less united at the base :—

Stamens 5 to very many ; sepals 5, 2 or more of them
enlarged in fruit ; petals 5, contorted ; leaves simple
alternate, not gland-dotted ; trees with resinous sap ;
stamens 10-100 ; ovary 3-celled, cells 2-ovuled ;
style singleXXIV. DIPTEROCARPACEAE.

Stamens 3-12 ; if more numerous, then leaves
gland-dotted :—

Leaves pellucid gland-dotted, simple or compound ;

sepals and petals 5 ; stamens sometimes numerous, inserted outside a prominent disk ; trees or shrubs, sometimes climbing, sometimes thorny

XXXIV. *RUTACEAE*.

Leaves not gland-dotted :—

Leaves opposite, simple ; calyx-lobes and petals 5 ; stamens 10 ; disk obscure ; ovary 3-celled, cells 1-ovuledXXXI. *MALPIGHIACEAE*.

Leaves alternate ; or if opposite, then disk large or stamens 5 :—

Carpels syncarpous and septate or apocarpous ; ovules few :—

Stamens alternate with the petals :—

Ovules and seeds pendulous ; or if horizontal (some *Meliaceae*), then the filaments united into a tube :—

Leaves compound ; or if simple, then the filaments united into a tube :—

Filaments free ; fruit drupaceous, indehiscent ; leaflets opposite

XXXV. *SIMARUBACEAE*.

Filaments united into a tube ; or if free, then the fruit capsular or the leaflets alternateXXXVIII. *MELIACEAE*.

Leaves simple :—

Petals 2-lobed, imbricate ; raphe of seed ventral

XXXIX. *DICHAPETALACEAE*.

Petals entire ; raphe of seed dorsal :—

Petals valvate ; fruit 1-celled, 1-seededXLII. *ICACINACEAE*.

Petals imbricate ; fruit of 3-5 1-seeded, free or connate stones

XLIII. *AQUIFOLIACEAE*.

Ovules and seeds erect or ascending :—

Ovary 3-5-celled ; leaves simple :—

Sepals and petals 4-5 ; stamens 4-5 ; seeds arillate, usually albuminous

XLIV. *CELASTRACEAE*.

Sepals and petals 5 ; stamens 3 ; seeds not arillate, not albuminous, sometimes wingedXLV. *HIPPOCRATEACEAE*.

Ovary 1-celled; or if 2-5-celled, then leaves compound

LII. ANACARDIACEAE.

Stamens opposite the petals :—

Petals valvate :—

Leaves exstipulate; ovules and seeds pendulous; fruit 1-celled, 1-seeded :—

Flowers in open racemes or cymes; bracts, if present, very small; ovary 3-5-celled; or if 1-celled, then trees or climbers with tendrils

XL. OLACACEAE.

Flowers in cone-like racemes or spikes (at least in bud); bracts patent; ovary 1-celled; climbers without tendrilsXLI. OPILIACEAE.

Leaves stipulate; ovules and seeds erect or ascending; fruit usually 2-celled, 2-6-seeded, rarely 1-celled, 1-seeded

XLVII. VITACEAE.

Petals imbricate; styles 2-3, free or connate; leaves exstipulate

LI. SABIACEAE.

Carpels syncarpous, 1-celled :—

Climbing shrubs with hooked branchlets; leaves simple; stamens 5-10; staminodes 0; ovary sessile; styles 3; ovule 1, erect or lateral

XXV. ANCISTROCLADACEAE.

Erect trees; leaves 2-3-pinnate; disk large, lining the calyx-tube; stamens 5; staminodes 5-7; ovary stipitate; style single; ovules numerous on 3 parietal placentas

LIII. MORINGACEAE.

Sepals valvate in bud; or if imbricate or subimbricate, then with valvate petals or 3-merous, 2-sexual flowers, or anthers dehiscing by pores or valves, or trees with balsaminous sap :—

Flowers 3-merous; sepals free, rarely united; stamens free, usually numerous; ripe carpels free, often stalked, rarely (*Anona*) conjoined; leaves simple; pith trabeculateIV. ANONACEAE.

Flowers 4-6-merous ; if 3-merous, then leaves compound or petals 5 ; sepals usually united into a lobed or toothed cup :—

Filaments of the anthers united into a column or cup :—

Stamens numerous, rarely few, in a column around the style with only short free filaments, or dividing into groups opposite the petals ; anthers 1-celled ; or if 2-celled, then the leaves compound-digitate ; staminal column adnate at the base to the contorted corolla-lobes ; an epicalyx often present ; leaves usually simpleXXVI. MALVACEAE.

Stamens usually 15, sometimes fewer, in a column or cup around the style, mouth of the column or cup usually with 5 sterile prolongations opposite the petals ; or if stamens more numerous, then petals 0 ; anthers 2-celled ; leaves simple ; or if compound-digitate, then petals 0

XXVII. STERCULIACEAE.

Filaments of anthers free, rarely slightly connate at the base in a ring or in 3-5 groups ; anthers 2-celled :—

Leaves imparipinnate ; stamens twice as many as the petals ; trees with balsaminous sap

XXXVII. BURSERACEAE.

Leaves simple, entire or lobed :—

Stamens usually numerous, at least twice as many as and free from the petals :—

Anthers opening by slits ; petals not ciliate or laciniate ; stamens borne on a torus ; fruit capsular or separating into cocci

XXVIII. TILIACEAE.

Anthers opening by pores or valves ; petals ciliate or laciniate ; stamens inserted on the disk between glands ; fruit a drupe with a single stone.....XXIX. ELAEOCARPACEAE.

Stamens 4-5, opposite to, usually more or less embraced by and adnate to the base of the petals

XLVI. RHAMNACEAE.

Stamens epigynous or perigynous, arising from the calyx or from a disk lining the calyx-tube ; or if arising from the corolla, then the ovary superior and carpels more than 3 ; segments of calyx always united (*Calyciflorae*) :—

Stems herbaceous or woody; or if fleshy, then not flattened or articulated; leaves patent:—

Ovary of 1 or more free carpels; or if carpels united, then more than 1-celled, or if 1-celled, then small herbs with pendulous ovules, or leaves radical and not glandular:—

Ovules attached to the inner angles or the bases of the carpels or cells; or if to the apex, then ovules very many:—

Carpels solitary excentric; style terminal; flowers irregular with 10 or fewer stamens or regular and usually with numerous stamens; ovules 1-many on the inner angle of the carpel; leaves almost always stipulateLV. LEGUMINOSAE. Carpels several; or if solitary, then the style not terminal or ovules at the base of the carpel and leaves exstipulate:—

Flowers bisexual, rarely polygamous and then petals 0:—

Carpels free; or if ultimately united at least the styles distinct:—

Stamens many; or if only 4-5, then styles basal; leaves stipulate; carpels 1-several, free or ultimately united; styles not terminal

LVI. ROSACEAE.

Stamens 5-10; stipules 0; styles terminal:—

Carpels quite free; sepals and petals 4-5; fruit follicular:—

Ovules 2 in each cell, ascending from the base; leaves alternate, 1-foliate or imparipinnate; trees or climbing shrubs

LIV. CONNARACEAE.

Ovules many on the inner angles of the cells; leaves opposite, rarely the upper alternate, simple; fleshy herbs

LVIII. CRASSULACEAE.

Carpels united; or if free, then petals 0; styles free; fruit capsular:—

Ovary 1-celled; ovules pendulous

LVII. SAXIFRAGACEAE.

Ovary 2-5-celled; or if 1-celled, then petals 0; ovules axile or basal

LXXVII. AIZOACEAE.

Carpels and styles united throughout; leaves simple; or if pinnate, then the whole plant submerged; stipules 0, or minute and deciduous:—

Calyx-lobes imbricate; or if valvate, then trees with flowers in long pendulous racemes and fruit a fibrous berry:—

Stamens many; anthers opening by slits; petals imbricate in bud:—

Leaves opposite (in *Eucalyptus* of 2 kinds and often the later to appear alternate), usually gland-dotted

LXIII. MYRTACEAE.

Leaves alternate, not gland-dotted

LXIV. LECYTHIDACEAE.

Stamens 3–12; anthers usually opening by pores; petals contorted in bud; leaves usually 3–5-ribbed

LXV. MELASTOMACEAE.

Calyx-lobes valvate; stamens 2–12; or if numerous, then leaves not gland-dotted and fruit a capsule:—

Ovary free from the calyx-tube; or if slightly adnate at the base, then sea-coast trees:—

Flowers axillary or in terminal panicles; petals usually crinkled; ovary quite free; ovary and fruit 1–6-celled

LXVI. LYTHRACEAE.

Flowers solitary, terminal; petals not crinkled; ovary slightly adnate at the base to the calyx-tube; ovary and fruit 10–15-celled; coastal trees

LXVII. SONNERATIACEAE.

Ovary completely or half adnate to the calyx-tube; stamens as many or twice as many as the petals and inserted with them; herbs and undershrubs, often in marshes, sometimes floating

LXVIII. ONAGRACEAE.

Flowers 1-sexual; ovary always inferior:—

Flowers symmetrical; stamens few, usually 3,

with sinuous or conduplicate anthers; styles united or free only at the apex; fruit not winged; climbers or prostrate plants, usually bearing tendrils ...LXXIII. CUCURBITACEAE. Flowers not symmetrical, stamens many, free or united into bundles; anthers ovoid; styles free or united only at the base; fruit often 2-3-winged; erect herbs or shrubs, usually more or less succulent

LXXV. BEGONIACEAE.

Ovules pendulous from the apex of the carpels or cells; ovary almost always inferior, usually more than 1-celled; ovules always few:—

Ovules 2 or more in each cell; or if only 1, then aquatic herbs with 1-sexual flowers:—

Herbs, often aquatic; styles 4, free; flowers often 1-sexual with solitary ovule

LX. HALORRHAGIDACEAE.

Trees or shrubs; flowers rarely 1-sexual; ovules always more than 1 in each cell; style single:—

Ovary 2-6-celled; or if 1-celled, then maritime trees; ovary often $\frac{1}{2}$ inferior; or if superior, then petals fimbriate; leaves opposite

LXI. RHIZOPHORACEAE.

Ovary 1-celled; leaves opposite or alternate; fruit often 2-5-winged

LXII. COMBRETACEAE.

Ovule 1 in each cell; flowers bisexual:—

Flowers in simple or compound umbels; leaves almost always alternate, usually compound:—

Herbs; fruit dry, separating into two dehiscent carpels with glandular tubules containing an essential oil

LXXVIII. UMBELLIFERAE.

Trees or shrubs, sometimes scandent; fruit usually fleshy; carpels generally more than 2, never separating spontaneously; devoid of glandular tubulesLXXIX. ARALIACEAE.

Flowers in axillary or terminal fascicles, cymes or panicles, not in umbels; fruit drupaceous, containing 1-4 stones; leaves always simple, entire; trees or shrubs:—

Calyx 4-10-toothed ; petals 4-10, linear ; style elongate ; stigma large, capitate

LXXX. ALANGIACEAE.

Calyx 4-5-lobed or truncate ; petals 4-5, ovate ; style short, small, not capitate

LXXXI. CORNACEAE.

Ovary syncarpous, usually free from the calyx, occasionally inferior or half inferior, 1-celled, placentas 3-5, parietal ; flowers regular, 3-9-merous ; ovules many ; styles usually distinct :—

Flowers bisexual ; or if 1-sexual, then trees with milky sap, palmately lobed leaves and superior ovary :—

Small herbs ; leaves beset with glandular hairs ; styles quite distinctLIX. DROSERACEAE.

Erect or climbing woody herbs, shrubs or trees without glandular hairs :—

Plants climbing by means of tendrils ; flowers often with a distinct corona between petals and stamensLXXI. PASSIFLORACEAE.

Erect undershrubs, shrubs or trees without tendrils ; flowers without corona :—

Flowers bisexual ; leaves entire or rarely pinnately lobed ; sap watery :—

Trees or large shrubs ; leaves entire, often bearing pellucid glands ; sepals and petals similar, petals 0LXIX. SAMYDACEAE.

Undershrubs ; leaves entire or pinnately lobed, not pellucid, but usually bearing 2 glands at the base ; sepals and petals very dissimilarLXX. TURNERACEAE.

Flowers dioecious ; leaves palmately lobed, subpeltate ; sap milky

LXXII. CARICACEAE.

Flowers 1-sexual or polygamous ; ovary inferior ; calyx-teeth minute ; petals 0 ; large trees

LXXIV. DATISCEAE.

Stem fleshy, flat, articulated, usually bearing large thorns and smaller spines ; leaves minute ; lobes of calyx, petals and stamens numerousLXXVI. CACTACEAE.

Petals almost always and sepals very often united, corolla rarely absent ; stamens almost always fewer than 12, usually

inserted on the corolla, seldom hypogynous, rarely epigynous ; ovary inferior ; or if superior, then carpels more than 3 (*Corollifloræ*) :—

Ovary inferior ; stamens as many as, rarely fewer than and always alternate with the corolla-lobes ; flowers regular or sometimes more or less irregular ; fruit never of 2 elongated follicles :—

Stamens inserted on the corolla :—

Anthers free ; ovary 2-many-celled ; calyx limb 0, annular, toothed, lobed or partite :—

Leaves opposite, usually herbaceous or membranous :—

Stipules 0, or represented by a mere rim, or very inconspicuous and lateral :—

Trees or shrubs, sometimes climbing ; fruit a 1-celled drupe or a 2-3-celled berry

LXXXII. CAPRIFOLIACEAE.

Herbs ; fruit dry, 1-seeded :—

Flowers in terminal paniced cymes ; calyx-limb obscure in flower, pappus-like in fruit ; stamens 3 ; ovary 3-celled, one 1-ovuled, two empty ; fruit without involucl

LXXXIV. VALERIANACEAE.

Flowers in long-peduncled, terminal heads surrounded by bracts ; bracteoles rigid ; calyx-limb cup-shaped, 4-lobed ; stamens 4 ; ovary 1-celled, 1-ovuled ; fruit enveloped in an involucl LXXXV. DIPSACEAE.

Stipules usually conspicuous, inserted within or between the petioles or leaf-like and whorled with the leaves ; ovary 2-10-celled ; ovules 1-many in each cell LXXXIII. RUBIACEAE.

Leaves alternate, fleshy ; flowers in axillary cymes ; corolla split to the base at the back ; ovary 2-celled ; ovules 2, erect ; style with a cup-shaped sheath including the stigma

LXXXVII. GOODENIACEAE.

Anthers cohering in a tube around the style, filaments free ; flowers usually in heads, rarely solitary, surrounded by an involucre of bracts ; calyx-limb 0 or reduced to pappus ; ovary 1-celled, 1-ovuled ; fruit dry ; leaves usually alternate

LXXXVI. COMPOSITAE.

Stamens free from the corolla ; ovary 2-15-celled ; ovules and seeds numerous ; corolla sometimes somewhat irregular ; herbs, sometimes tall

LXXXVIII. CAMPANULACEAE.

Ovary superior ; or if inferior, then stamens more numerous than the corolla-lobes and anthers produced into two tubes opening by pores ; or if half inferior, then stamens opposite the corolla-lobes :—

Ovary 1-celled ; placentation free-central ; stamens inserted on the corolla ; or if nearly free, then calyx covered with stalked glands :—

Stamens as many as and opposite to the lobes of a regular corolla :—

Ovule solitary, pendulous from an ascending funicle ; style 5-fid ; calyx beset with stalked glands

XCI. PLUMBAGINACEAE.

Ovules 2-many ; style undivided ; calyx not bearing stalked glands :—

Herbs ; fruit capsular ; leaves often in radical rosettes, not gland-dotted

XCII. PRIMULACEAE.

Trees or shrubs, sometimes scandent ; fruit a berry ; leaves often gland-dotted

XCIII. MYRSINACEAE.

Stamens 2, alternate with the 3 anterior lobes of a 2-lipped corolla ; small, often aquatic herbs

CIX. LENTIBULARIACEAE.

Ovary 2-many-celled ; or if 2-celled, then placentas axile or parietal ; or if the ovule basal and erect, then the style undivided :—

Stamens free from the corolla and usually more numerous than its lobes :—

Flowers bisexual ; stamens usually twice as many as the corolla-lobes ; style simple ; ovules many in each cell :—

Ovary inferior, 5-celled, or apparently but falsely 10-celled ; fruit a berry

LXXXIX. VACCINIACEAE.

Ovary superior, 5-20-celled ; fruit capsular

XC. ERICACEAE.

Flowers dioecious ; stamens as many as and opposite the corolla-lobes or twice as many or more ; ovary

superior, 3-10-celled; styles 2-8; ovules always twice as many as the styles, 1-2 in each cell

XCV. EBENACEAE.

Stamens inserted on the corolla :—

Ovary 3- or more-carpelled; or if 2-carpelled, then stamens either as many as and opposite the corolla-lobes or more numerous :—

Ovary superior; 2-8-celled; ovules 1 in each cell, axile; trees with milky sap or thorny

XCIV. SAPOTACEAE.

Ovary inferior, 2-4-, usually 3-celled; ovules 2-4 in each cell, pendulous from the inner angles; trees or shrubs; sap watery; not thorny

XCVI. SYMPLOCACEAE.

Ovary 2-carpelled; or if 3-5-carpelled, then stamens either as many as and alternate with the corolla-lobes or fewer :—

Corolla regular, rarely slightly oblique; stamens as many as and alternate with the corolla-lobes; or if corolla oblique or irregular and stamens fewer than the lobes, then corolla-limb plicate or sub-contorted, or stamens 2 and alternate with the carpels :—

Leaves opposite; or if alternate, then either floating aquatic plants with 1-celled ovary, or with free carpels and united styles; or if carpels united, then with a ring of hairy scales in the corolla-throat hiding the stamens; if leaves 0, then sap milky and stamens united :—

Stamens 2, alternate with the carpels; corolla-lobes 4-9, imbricate or valvate; ovary 2-celled, cells 2- or rarely 1-4- or 8-ovuled; stipules 0

XCVII. OLEACEAE.

Stamens 4 or more, alternate with the corolla-lobes :—

Corolla-lobes or free petals and stamens 4; lobes of corolla imbricate in bud; ovary 1-2-celled, cells 1-2-ovuled :—

Trees with united petals or thorny shrubs with free petals; leaves opposite; flowers paniced, all alike

XCVIII. SALVADORACEAE.

Scapigerous herbs with united petals; leaves radical; flowers in simple, elongate spikes, often dimorphic CXVI. PLANTAGINACEAE. Corolla-lobes 5, rarely 6-7; or if 4, then the 1-2 cells of the ovary many-ovuled:—

Carpels free; styles united; or if carpels also united, then corolla-lobes contorted and twisted clockwise; corolla-lobes and stamens always 5; anthers usually connate; herbs, shrubs, often climbing, and trees usually with milky sap:—

Pollen granular; stigma annular or interrupted below the smooth, non-stigmatic, entire or 2-fid tip of the style; fruit berry-like, drupaceous or of 2 free, rarely cohering follicles XCIX. APOCYNACEAE. Pollen waxy or granular, aggregated in solitary or paired masses in each cell of the free or connate anthers; filaments usually connate; apex of the style flattened into a plane or beaked disk with stigmatic border, bearing 5 glands to which the pollinia are attached in pairs or fours; fruit of 2, rarely 1, free follicles C. ASCLEPIADACEAE.

Carpels and styles always united; stigma terminal; corolla-lobes imbricate or valvate; or if contorted, then twisted anti-clockwise; corolla-lobes and stamens 4-5, or occasionally many:—

Stipules present or represented by a raised line joining the bases or petioles of opposite leaves; corolla-lobes valvate or imbricate; or if contorted, then corolla long-tubular and placentas 2-fid; ovary 2-celled CI. LOGANIACEAE. Stipules 0, not represented by a raised line; corolla-lobes contorted; or if valvate, then leaves alternate; ovary 1-celled; or if 2-celled, then corolla short, rotate and placentas undivided

CII. GENTIANACEAE.

Leaves alternate; if opposite or subopposite, then ovary 4-celled; if leaves 0, then parasitic herbs with watery sap and free stamens; carpels never free; if aquatic herbs, then ovary 2-celled:

Ovary-cells many-ovuled:—

Corolla-lobes imbricate; styles 2; small herbsCIII. HYDROLEACEAE.

Corolla-lobes plicate; style single; herbs or shrubs, rarely trees

CVI. SOLANACEAE.

Ovary-cells 2-, seldom 1-, rarely 4-ovuled:—

Corolla-lobes imbricate or contorted; ovary 2-celled, cells 2-ovuled or spuriously 4-celled and cells 1-ovuled; fruit of two 1-2-seeded pyrenes or of four 1-seeded nutlets; embryo with superior radicle; herbs, shrubs or trees

CIV. BORAGINACEAE.

Corolla-lobes plicate; if imbricate, then fruit a valvular capsule or leafless parasitic plants; ovary 2-, rarely 3-5-celled; fruit usually dehiscent, or if indehiscent, then embryo with inferior radicle; usually climbing plantsCV. CONVULVULACEAE.

Corolla irregular or at least distinctly oblique, lobes overlapping; uppermost stamen smaller than the rest or reduced to a staminode or absent; or if corolla regular and cells of ovary 1-2-ovuled, then embryo with inferior radicle:—

Carpels 2- or more, usually many-ovuled; or if only 2-ovuled, then ovules superposed, or if collateral, then fruit a 2-valved capsule opening elastically from the apex:—

Ovary 1-celled with parietal placentas; or if 2-celled by the intrusion of the placentas only imperfectly so; ovules many:—

Leafless herbs parasitic on roots; seeds very small; embryo very minute

CVIII. OROBANCHACEAE.

Leafy green herbs or undershrubs, sometimes epiphytic; ovary often inferior; leaves usually oppositeCX. GESNERIACEAE.

Ovary 2-celled :—

Fruit not opening elastically, rarely indehiscent :—

Seeds small or minute, not winged ; leaves simple, sometimes very deeply lobed ; herbs or shrubs :—

Ovules many on placentas attached to the middle of the septum ; seeds almost always albuminous

CVII. SCROPHULARIACEAE.

Ovules attached singly or 1-seriately under the leaves of a projecting parietal 2-bladed placenta ; or with 2 ovules in each cell ; or the 2 cells spuriously 4-celled by the intrusion of a false septum with many ovules attached singly or 2-seriately to the inner angles ; seed not albuminous....CXII. PEDALIACEAE

Seeds rather large, transverse, with broad, membranous or hyaline wings ; or if not winged, then trees with imparipinnate leaves ; embryo horizontal ; fruit capsular ; leaves compound...CXI. BIGNONIACEAE.

Fruit opening elastically from the apex of 2 loculicidal valves ; seeds usually supported on upcurved processes from the placentas ; leaves simple, opposite

CXIII. ACANTHACEAE.

Carpels 1-ovuled ; or if 2-ovuled, then ovules collateral, not superposed and fruit indehiscent, 1-seeded ; leaves opposite or whorled :—

Fruit not 4-lobed ; or if 4-lobed, then drupaceous ; or if separating into nutlets, then ovary entireCXIV. VERBENACEAE.

Fruit separating into 4 distinct nutlets or, less often, drupes, rarely 4-lobed and not separating, and then not drupaceous ; ovary always 4-lobedCXV. LABIATEAE.

Corolla rarely present and calyx often absent, sometimes perianth altogether lacking ; flowers more often 1- than 2-sexual (*Mono-chlamydeae*) :—

Flowers very often 2-sexual; or if 1-sexual, then the embryo peripheric-annular, or the ovule not clearly distinguishable from the carpellary tissue and the seeds without testa, or perianth-lobes 2-seriate and anthers opening by valves; perianth almost always present, usually single; or if double, then the outer whorl very small, seeds without testa and stamens opposite the inner perianth-lobes; or if perianth 0, then embryo peripheric-annular:—

Ovary inferior; seeds with copious albumen:—

Ovary 4–6-celled; ovules very many, 1–2-seriate; seeds with a distinct testa; perianth 3-lobed, usually irregular; stamens 6–12; scandent herbs or shrubs or erect shrubs

CXXII. ARISTOLOCHIACEAE.

Ovary 1-celled; ovules 1–4; seeds without proper testa; stamens as many as and opposite the inner or only perianth-lobes:—

Ovules solitary, basal, erect; perianth corolline, single or occasionally double, the inner coloured, large, the outer minute; epiphytic, parasitic herbs, undershrubs or shrubs.....CXXXI. LORANTHACEAE.

Ovules 2–4, pendulous from a free-central column; perianth always single, calycine or corolline; terrestrial herbs, shrubs or trees, frequently root-parasites

CXXXII. SANTALACEAE.

Ovary superior, quite free or its base adnate to the persistent perianth-base; 1-, less often 2–3-celled; ovule 1- or 2-many on a free-central placenta, or many axile or parietal:—

Seeds usually with copious albumen; or if albumen scanty or 0, then embryo curved and excentric or peripheric; usually herbs, rarely shrubs or trees:—

Stipules 0; ovary 1-celled, 1-ovuled:—

Perianth tubular, its base adhering to the ovary, tube long or short, limb truncate or 3–5-toothed or -lobed, segments plicately or simply valvate

CXVII. NYCTAGINACEAE.

Perianth-lobes united only at the base, always imbricate; stamens 1–5, often connate at the base:—

Perianth scarious and dry; flowers always with scarious or hyaline bracts and 2 bracteoles; anthers 1–2-celled; leaves membranous, opposite or alternate, never terete ..CXVIII. AMARANTACEAE.

Perianth membranous, herbaceous, coriaceous or

fleshy or 0, never scarious ; flowers sometimes sunk in the nodes of a jointed rhachis, rarely bracteate, very rarely both bracteate and 2 bracteolate ; anthers 2-celled ; leaves alternate or 0, often fleshy, sometimes tereteCXIX. CHENOPODIACEAE.

Leaves stipulate ; stipules usually connate in a tube around the nodes, persistent or rarely deciduous and leaving a circular scar ; perianth membranous, often coloured, segments 3-6, connate or free ; herbs or shrubs, sometimes climbingCXX. POLYGONACEAE.

Seeds without albumen ; or if albuminous, then embryo straight :—

Aquatic, usually annual herbs, closely attached to submerged rocks ; flowers bisexual, regular, 3-merous with a perianth, or irregular, 2-merous and devoid of perianthCXXI. PODOSTEMONACEAE.

Terrestrial trees, shrubs or climbers ; perianth always present :—

Perianth-tube narrowed above the ovary, subcorolline, base persistent, upper part deciduous, lobes 4, short, valvate ; stamens 4, alternate with the lobes ; ovary 1-celled ; ovule 1, erect ; trees or shrubs with silvery or stellate scalesCXXX. ELAEAGNACEAE.

Perianth-tube not narrowed above the ovary, lobes rather long ; stamens as many as and opposite the perianth-lobes, or twice, rarely thrice as many ; ovary 1-celled ; or if 2-celled, then with a ring of connate scales above the stamens :—

Perianth-lobes 4, valvate, revolute in open flower ; stamens 4 in 1 series ; anthers opening by slits ; ovules 2, basal or lateral, ascending

CXXVIII. PROTEACEAE.

Perianth-lobes 4 or 6, imbricate ; stamens often in 2, less often in 3 or 4 series ; ovules pendulous :—

Perianth-tube very short, lobes 4 or 6, 2-seriate ; stamens in 2-4-series, usually accompanied by glands ; anthers 2- or 4-celled, opening by as many upcurved, valvular lids ; shrubs or trees, rarely parasitic, twining herbs

CXXVI. LAURACEAE.

Perianth-tube rather long ; lobes 4-5, 1-seriate ; stamens not accompanied by glands ; anthers

opening by slits; if ovary 2-celled, then with a ring of connate scales above the stamens; shrubs or treesCXXIX. THYMELIACEAE.

Flowers 1-sexual; or if 2-sexual, then perianth 0; perianth, when present, single; or if double, then the outer whorl conspicuous with the stamens either all central or the outer whorl of stamens alternate with the inner perianth-lobes; or if the stamens of the outer whorl opposite the inner perianth-lobes, then the seed with a testa and the plant not parasitic; ovary superior; or if inferior, then stamens opposite to and more numerous than the perianth-lobes; anthers never opening by valves:—

Leafy herbs, shrubs or trees; leaves sometimes much reduced and then sap milky:—

Terrestrial plants:—

Ovary 1-carpelled, 1-celled; or if syncarpous, then 2- or more-celled; ovules 1-2, collateral in each cell; or if ovary imperfectly 3-4-celled with 6-8 ovules in each, then flowers 2-sexual:—

Stipules 0; trees:—

Flowers bracteolate; perianth 3, sometimes 4-lobed; stamens 6-30, connate in a column; staminodes 0; ovary superior, free, 1-celled; ovule 1, erect; fruit fleshy, at length 2-4-valved; seed enclosed in a thin or fleshy arilCXXV. MYRISTICACEAE.

Flowers without bracteoles or bracts; perianth 4-7-partite in ♂, 2-lobed in ♀; stamens 4-7, free, alternating with clavate staminodes; ovary adhering to the perianth, 1-celled; ovule 1, pendulous; fruit a drupe-like nut crowned with the elongate, spathulate, wing-like perianth-lobes; seed without arilCXXVII. HERNANDIACEAE.

Stipules present though sometimes minute and often early deciduous; or if absent, then flowers bisexual and perianth 0:—

Ovary 1-celled, 1-ovuled; flowers usually very small:—

Seeds with copious albumen and a minute embryo; perianth almost always 0; herbs or shrubs:—

Flowers usually 1-sexual, sometimes bisexual; leaves usually alternate, sometimes opposite or

whorled, often unequal-sided ; stamens 2-4, filaments short, free ; anthers 2-celled ; ovule erect ; herbs or shrubs, often aromatic, sometimes scandentCXXIII. PIPERACEAE. Flowers spuriously bisexual, the ♂ and ♀ connate on a bract ; leaves opposite, equal-sided ; stamens 1, or 3 confluent and then the central anther 2-celled, the two lateral 1-celled ; ovule pendulous ; erect shrubs

CXXIV. CHLORANTHACEAE.

Seeds with little or no albumen and a large embryo filling the seed-coats ; or if albumen copious, then the embryo nearly or quite as long as the albumen ; flowers generally 1-sexual, often dioecious, rarely bisexual or polygamous ; perianth dioecious, rarely bisexual or polygamous ; perianth usually present :—

Filaments not inflexed in bud nor with reversed anthers ; sap watery ; ovule pendulous :—

Trees with simple, alternate leaves ; fruit dry and winged or drupaceous

CXXXVI. ULMACEAE.

Herbs or shrubs with palmate, compound, opposite leaves, or only the uppermost sometimes 1-foliate and alternate ; fruit a small achene

CXXXVII. CANNABINACEAE.

Filaments inflexed in bud with reversed anthers :—

Styles or style-branches 2 ; or if style single and undivided, then large trees with a milky sap or flowers with a single stamen ; ovules pendulous ; leaves alternate, rarely opposite and then the flowers aggregated on the inner walls of a closed receptacle ; herbs, shrubs and trees, usually with milky sap

CXXXVIII. MORACEAE.

Style single, undivided ; stamens 3-5 ; ovule basal, erect ; leaves alternate or opposite ; herbs, shrubs or trees with watery sap, sometimes beset with stinging hairs

CXXXIX. URTICACEAE.

Ovary 2-more-celled, rarely 1-celled, with 2 ovules in each cell; or if ovary 1-celled, 1-ovuled, then stamens many more than the perianth-lobes and those of the outer or only series opposite the lobes; seeds usually with copious albumen; or if albumen scanty or 0, then fruit a capsule or drupe or berry-like with fleshy or leathery pericarp:—

Stipules 0; perianth single, lobes free, imbricate; stamens as many as and opposite the perianth lobes; evergreen shrubs with watery sap

CXXXIV. BUXACEAE.

Stipules almost always present, though often minute or falling early; perianth usually single, sometimes double or lacking in either or both sexes, outer series valvate or imbricate, inner, when present, free; stamens various, often very many, filaments frequently connate; herbs, shrubs and trees, very often with milky sap

CXXXV. EUPHORBACEAE.

Ovary syncarpous, 1-celled, placentas 2-4, not intruded; ovules 4 or more, 2-seriately superposed on each placenta; flowers in catkins, 1-sexual; seeds small with a pencil of long silky hairs; leaves simple, stipulate; trees

CXLI. SALICACEAE.

Submerged, dichotomously branched herbs; leaves whorled, dichotomously cleft into filiform segments; flowers monoecious

CXLII. CERATOPHYLLACEAE.

Leafless herbs or trees:—

Fleshy root-parasitic herbs devoid of chlorophyll; flowers dioecious, in crowded heads

CXXXIII. BALANOPHORACEAE.

Trees with slender, jointed, green branchlets with whorls of small scales at the nodes; flowers minute, monoecious or dioecious, in spikes or globose heads; perianth 0 in ♀, of 1-2 scarious scales in ♂

CXL. CASUARINACEAE.

Stem without central pith, the woody substance in isolated bundles embedded in cellular tissue encased in a firmly adhering outer rind; leaves usually sheathing at the base and not articulated on the stem; their veins usually parallel and unbranched, running from base to apex and connected by straight cross-veinlets; embryo with only 1 cotyledon, the young stem arising from a lateral cavity (*Mono-cotyledones*):—

Perianth 2-seriate, the segments of both corolline, rarely sub-herbaceous, and if so then with inferior, 1-celled ovary; or if only the inner series corolline, then its segments much larger than those of the outer series; ovary syncarpous; or if perianth 1-seriate, then ovary 1-celled and either scapigerous herbs with corolline perianth or submerged marine plants with calycine perianth :—

Seeds very small, often very minute; albumen 0, or scanty :—

Outer perianth-segments calycine, inner corolline or 0; stamens 3, 6, 9 or 15, rarely 1-2 by suppression, some often converted into staminodes; aquatic, usually submerged herbs with regular, often 1-sexual flowers

CXLVI. HYDROCHARITACEAE.

Perianth-segments of both series corolline; flowers 2-sexual :—

Flowers regular; anthers 6 or 3, sessile or subsessile on the perianth, not united to the gynoeceum; ovary 3-celled; albumen of seeds scanty; small annual herbs

CXLVII. BURMANNIACEAE.

Flowers irregular, usually markedly so by the modification of one segment of the inner series to form a lip; androeceum and gynoeceum confluent as a column bearing 1, rarely 2, sessile or nearly sessile anthers, ovary 1-celledCXLVIII. ORCHIDACEAE.

Seeds conspicuous, with copious albumen :—

Ovary inferior, 3-celled; or if 1-celled, then either flowers very irregular or leaves pinnatifid :—

Flowers very irregular; outer perianth-segments calycine; perfect stamen 1 with 5 staminodes or rarely 5 or 6 perfect with 1-0 staminode; seeds often arillate :—

Both series of perianth united, tubular or spathaceous; anthers 2-celled :—

Inner perianth-series funnel-shaped below, 3-lobed above; style embraced below the stigma by the single anther; ovary sometimes 1-celled; fruit usually capsularCXLIX. ZINGIBERACEAE.

Both perianth-series spathaceous, entire or toothed; stamens free, 5 perfect with 1-0 staminode, rarely 6 perfect; fruit berry-like, elongate-oblong

CLII. MUSACEAE.

Outer perianth-series of 3 free, equal or subequal segments, inner 3 united into a tube below; single

anther 1-celled, laterally adnate to a broad petaloid filament :—

Ovule 1 in each cell; embryo curved; style excentric, incurved or involute ..CL. MARANTACEAE.

Ovules many in each cell; embryo straight; style terminal, flattenedCLI. CANNACEAE.

Flowers regular or nearly so :—

Outer perianth-series calycine; stamens 6

CLIII. BROMELIACEAE.

Both perianth-series corolline; or if, rarely, both subherbaceous, then leaves pinnatifid; stamens usually 6, rarely 3 with 3 staminodes :—

Leaves radical, pinnatifid; filaments dilated at apex into a hood containing the anthers; ovary 1-celled; fruit a berryCLVI. TACCACEAE.

Leaves entire; or if simply lobed or digitately compound, then climbing herbs with 1-sexual flowers and winged capsules :—

Ovules many, 2-seriate on the inner angle of each cell; leaves radical or clustered at the apex of a short stem; herbs or large shrubs, the root a bulb corm or tuberCLV. AMARYLLIDACEAE.

Ovules 2-several in each cell, not 2-seriate :—

Leaves radical, ovules 2-several, basal, erect; erect herbs; fruit not winged

CLIV. HAEMODORACEAE.

Leaves cauline or terminal; ovules 2, superposed; climbing, rarely erect herbs or shrubs with 3-winged capsules CLVII. DIOSCOREACEAE.

Ovary superior; flowers regular or nearly so :—

Inflorescence not a bracteate head; both perianth-series present and of the same number of subequal segments :—

Both perianth-series corolline :—

Perianth-segments 2-merous; stamens 4; ovary 1-celled; twining plants CLVIII. ROXBURGHACEAE.

Perianth segments 3-merous; stamens 6 or 3 :—

Dry-ground herbs or shrubs, sometimes climbing; inflorescence never terminating a 1-leafed scape; embryo small, shorter than and completely enclosed in the albumenCLIX. LILIACEAE.

Aquatic, erect or floating herbs; inflorescence terminating a 1-leafed scape; embryo cylindric,

as long as and lying in a central canal in the albumenCLX. PONTEDERIACEAE.

Outer perianth-series calycine, inner corolline; embryo marginal or only partly enclosed in the albumen

CLXII. COMMELINACEAE.

Inflorescence in a dense head supported by rigid, dark-brown, imbricating bracts; perianth 3-merous, outer segments bract-like, scarious, one conspicuously larger than the other 2, inner segments corolline

CLXI. XYRIDACEAE.

Perianth-series both calycine; or if the inner series corolline, then its segments not larger than those of the outer ones; or if the perianth 1-seriate, then calycine and either terrestrial plants or aquatic herbs with 1-carpelled or apocarpous ovary; or perianth reduced to scales or bristles or altogether wanting; or if perianth-segments of inner series corolline and larger than those of the outer series, then aquatic herbs with apocarpous ovary; ovary always superior:—

Perianth regularly 2-seriate, 3-merous; ovary syncarpous; seeds albuminous; or if ovary apocarpous and seeds without albumen, then in erect, scapigerous herbs with conspicuous, whorled, paniculate or umbellate flowers:—

Both perianth-series calycine, rigid or herbaceous; ovary syncarpous; albumen copious:—

Grass-like herbs with slender, linear or terete leaves, or leaves reduced to sheaths; flowers in bracteate cymes; fruit a 3-valved capsule; embryo enclosed in the albumen

CLXIII. JUNCACEAE.

Trees or shrubs, sometimes climbing by hooked thorns, with flabellate-plicate or pinnatisect leaves; flowers in 1 or more sheathing spathes; fruit indehiscent; embryo in a small pit near the circumference of the albumen

CLXIV. PALMACEAE.

Perianth of a single series of calycine, valvate segments, or of 2 series with the outer herbaceous and the inner corolline; ovary apocarpous; albumen 0:—

Leafless, saprophytic herbs without chlorophyll; perianth 1-seriate, 3-8-partite or -lobed; flowers insignificant, monoecious or dioecious, in terminal corymbs or racemes

CLXIX. TRIURIDACEAE.

Leafy, green, marsh- or water-plants, often with milky juice; perianth 2-seriate, outer 3 herbaceous, inner 3

corolline ; flowers 2-sexual or monoecious, conspicuous in umbellate or paniced whorlsCLXX. ALISMACEAE. Perianth 0, or reduced to scales or bristles ; or if perianth herbaceous or hyaline, then the segments either not regularly 3-merous, or if, rarely, 6 in 2 rows, then erect, aquatic weeds with small flowers in simple racemes or spikes and fleshy, not horseshoe-shaped embryo :—

Inflorescence of many- or few-flowered spadices or spikes or racemes ; or if flowers solitary, then not in the axils of modified, glumaceous bracts :—

Flowers on a spadix subtended and usually covered by a more or less modified spathe ; terrestrial trees or shrubs, sometimes scandent, sometimes marsh plants, very rarely free floating :—

Shrubs or trees with long, ensiform, spinulose leaves arranged in 3-farious spirals ; often with aerial roots ; flowers dioecious, crowded and catkin-like ; spadix often branched ; spathe little modified, sometimes coloured ; perianth 0CLXV. PANDANACEAE.

Herbs or shrubs, sometimes climbing by aerial roots ; seldom marsh plants, very rarely free floating ; flowers 2-sexual or monoecious, rarely dioecious and then tuberous-rooted with much modified spathes ; spadix simple ; leaves not in spirals rarely spinous ; perianth 0 or of scalesCLXVII. ARACEAE.

Flowers not on a spadix ; or if on a spadix, then not covered by a spathe or spathaceous bracts ; aquatic or marsh plants, sometimes free-floating :—

Free-floating minute, lenticular or granular plants with 1 or more roots that do not enter the soil ; flowers very minute from the margins or the upper side of a frond ; perianth 0CLXVIII. LEMNACEAE.

Fixed herbs with erect, scapigerous or elongate floating or submerged leafy stems, arising from a usually creeping stock rooted in the soil ; perianth present or 0 :—

Perianth of filiform bristles or membranous scales ; rootstock creeping, emitting annual stems ; leaves elongate, linear ; flowers on cylindric or globose 1-sexual, superposed spadices ; ovary 1-celled, borne on a hairy gynophoreCLXVI. TYPHACEAE.

Perianth 0, or of 1-4 herbaceous or hyaline segments,

or tubular; inflorescence rarely spadix-like and then in herbs with leafy submerged floating stems; ovary sessile, of 1-several free carpels; fruit of follicles or an achene; or if drupaceous, then of 2 or more free carpels; marine or fresh-water erect or floating herbs:—

Flowers in racemes or spikes; or if axillary, then the ovule solitary and pendulous; ovary of 2-9 free carpels; fruit of follicles or drupelets:—

Ovules 2-8; basal or 2-seriate on the ventral suture, ascending; perianth of 1-3 white or coloured segments; stamens 6 in 2 whorls; fruit of 3 inflated, beaked follicles

CLXXI. APONOGETONACEAE.

Ovule 1, apical or parietal, pendulous; perianth 0, or of 3-4 green segments, rarely cupular; anthers 1-4, sessile; fruit of 2-9 drupelets

CLXXII. POTAMOGETONACEAE.

Flowers axillary, solitary or clustered; ovary of 1 carpel; ovule 1, basal, erect; perianth tubular, herbaceous or hyaline, or 0 in ♀; anther 1, adnate to the perianth; fruit an achene

CLXXIII. NAJADACEAE.

Inflorescence of heads or spikelets composed of solitary flowers in the axils of glumaceous bracts; perianth segments small, bristle- or scale-like or 0; seeds albuminous:—

Flowers in depressed or subglobose, usually androgynous heads, always 1-sexual; ovary 3- or 2-celled; ovule 1 in each cell, pendulous; perianth segments 6 or fewer, usually in 2 series, membranous, scarious or hyaline, free or connate; usually aquatic or marsh, scapigerous herbs

CLXXIV. ERIOCAULACEAE.

Flowers in spikelets with imbricating glumes, 1- or 2-sexual, rarely dioecious; ovary 1-celled; ovule 1, erect or ascending; perianth 0 or of bristles or scales; grassy herbs, shrubs or trees:—

Stems solid; leaves 3-ranked, rarely 0; sheaths rarely with a ligule, closed in front; perianth 0 or of bristles or scales; fruit a compressed or 3-angled nut with the seed free within; embryo inside the albumen; *sedges*

CLXXV. CYPERACEAE.

Stems usually hollow except at the nodes; leaves 2-ranked, very rarely subspirally arranged; sheaths almost always with a ligule and split in front; perianth represented by 2, rarely 3 or more hyaline scales, rarely 0; fruit a grain with the seed-coat adhering to the pericarp, rarely free within it; embryo at the base of the albumen: *grasses* and *bamboos*

CLXXVI. GRAMINEAE.

Complete
FLORA *with 11*
plates

OF THE

PRESIDENCY OF MADRAS

BY

J. S. GAMBLE, C.I.E., M.A., F.R.S., F.L.S.

LATE OF THE INDIAN FOREST DEPARTMENT

PART I.

RANUNCULACEAE TO OPILIACEAE

PUBLISHED UNDER THE AUTHORITY OF THE
SECRETARY OF STATE FOR INDIA IN COUNCIL

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CARPENTIER

INTRODUCTION TO PART I.

It has been arranged that the 'Flora of Madras' should issue in Parts of 192 pages each, and this is the first of the Parts. Others will issue by degrees until the whole is complete, when the Introduction to the whole with the Key to the Families will be prepared, to be placed, for binding purposes, at the beginning of the work.

It is right to explain here that the draft of the botanical portion of about the first 132 pages was prepared by Mr. S. T. Dunn, B.A., F.L.S., F.R.G.S., late Superintendent of the Botanical and Forestry Department at Hong Kong. He was then, most unfortunately, obliged to relinquish his share in the work, so that the responsibility for its continuation and for the work of editing the whole rests entirely with the undersigned.

J. S. GAMBLE.

Liss: Nov. 1915.

FLORA OF MADRAS.

I. THALAMIFLORAE.

Sepals herbaceous, rarely petaloid, distinct, imbricate or valvate or connate in a tube with lobes imbricate valvate or open, free or, rarely, with the base of the tube adnate to the base of the ovary. *Torus* small, or raised or stalk-like, or thickened or fleshy or crowned by a disk, annular or cupular or flattened, entire or lobed or broken into glands, free or adnate to calyx and ovary or to ovary alone, rarely to calyx alone. *Petals* 1-2-seriate, unlike the sepals, or 2-many-seriate passing gradually from the sepals or as many as the sepals or fewer by abortion, inserted on the torus or adnate to the base of the calyx external to the disk, or sometimes when the disk is absent adnate at the base to the stamens, or 0. *Stamens* numerous or few, inserted on the torus or rarely on the base of the calyx, free or adnate to the base of the petals, or few and inserted around upon or within the disk. *Carpels* free or connate, or rarely more or less embedded in the fleshy torus, or immersed in the thickened disk.

Family I. RANUNCULACEAE.

Annual or perennial herbs or rarely shrubs. *Leaves* radical or alternate or rarely opposite. *Stipules* 0, or adnate to the petiole or, rarely, free. *Flowers* bisexual or unisexual, regular or irregular. *Bracts* rare. *Disk* very rare. *Sepals* 5 or more, rarely fewer, very rarely persistent, often petaloid, imbricate or rarely valvate. *Petals* 5 or more or 0, rarely 4 or 3, hypogynous, imbricate, often minute or deformed. *Stamens* hypogynous, usually numerous in many rows. *Anthers* adnate, opening laterally or outwards. *Carpels* numerous, rarely 1, free or rarely coherent; stigma simple, usually sessile; ovules anatropous, sometimes solitary, ascending with a ventral raphe or pendulous with a dorsal raphe, sometimes numerous and horizontal on the ventral suture. *Fruit* of one-seeded beaked or plumose achenes or many-seeded follicles or rarely a capsule or berry. *Seeds* small, with copious albumen and a minute embryo.

Leaves opposite ; sepals valvate ; climbing shrubs :—

Petals 0 ; tendrils 0 ; ripe carpels ovate.....1. **Clematis**.

Petals many, linear ; terminal leaflet generally transformed into a tendril ; ripe carpels linear2. **Naravelia**.

Leaves radical or alternate ; sepals imbricate ; herbs :—

Petals 0, but sepals often petaloid :—

Flowers moderately large, supported by an involucre of bracts

3. **Anemone**.

Flowers small, not involucre4. **Thalictrum**.

Petals and sepals present.....5. **Ranunculus**.

1. **Clematis**, Linn.

Climbing shrubs. *Leaves* opposite, simple or compound, exstipulate, petioles often twining. *Inflorescence* axillary or terminal. *Sepals* usually 4, petaloid, valvate. *Petals* 0. *Stamens* many. *Carpels* numerous, distinct, with 1 pendulous ovule in each. *Fruit* a head of sessile or stalked achenes with long usually feathery styles.

Stamens with glabrous filaments :—

Flowers over 1 in. in diam., few in a panicle ; sepals velvety brown outside ; leaflets usually 7-ribbed, sometimes serrate ; achene tails 2–3 in. long :—

Sepals at maturity glabrous within ; connective much produced beyond the anther ; leaves 1–3-foliolate :—

Flowers erect ; filaments uniform in thickness.....1. *smilacifolia*.

Flowers nodding ; filaments constricted below the anthers

2. *Munroana*.

Sepals tomentose within when mature ; connective produced very little if at all beyond the anther ; leaves 3-foliolate...3. *theobromina*.
Flowers under 1 in. in diam., many in a panicle ; sepals puberulous ; leaflets 3–5-ribbed, sometimes coarsely toothed ; achene tails 2 in. long :—

Flowers more than .7 in. in diam. ; connective produced considerably beyond the anther.....4. *Bourdillonii*.

Flowers under .5 in. in diam. ; connective not produced

5. *gouriana*.

Stamens with pubescent filaments ; leaves pubescent or tomentose ; leaflets usually 3–5-lobed, more or less coarsely dentate ; flowers over 2 in. in diam., pale yellow :—

Sepals ovate, spreading from the base ; veins of leaflets thick, prominent.....6. *Wightiana*.

Sepals oblong-lanceolate, erect at the base, recurved at the tip ; veins of leaflets slender, little raised7. *nutans*.

1. *CLEMATIS SMILACIFOLIA*, Wall. ; F. B. I. i. 3 ; Wt. Ic. t. 1.

Hills of Ganjam ; W. Gháts from S. Canara to Tinnevely, up to 5,000 ft.

2. *CLEMATIS MUNROANA*, Wt. Ill. i. 5, t. 1.

Hill ranges from Coorg through the Nilgiris, Anamalais and Pulneys.

3. *CLEMATIS THEOBROMINA*, Dunn in Kew Bull. 1914, 181.

Nilgiris, at Coonoor and Naduvatam at 6,000 to 8,000 ft. alt.

4. *CLEMATIS BOURDILLONII*, Dunn in Kew Bull. 1914, 181.

Travancore, Merchiston Estate, at 2,500 ft. alt.

5. *CLEMATIS GOURIANA*, Roxb. ; F. B. I. i. 4 ; W. & A. 2 ; Wt. Ic. t. 933-4.

A very common species, found in hilly regions in almost all Districts.

6. *CLEMATIS WIGHTIANA*, Wall. ; F. B. I. i. 5 ; W. & A. 2 ; Wt. Ic. t. 935.

Hills of Ganjam and south to the Kistna ; common in the W. Gháts, especially in Nilgiris, up to 7,500 ft.

7. *CLEMATIS NUTANS*, Royle ; F. B. I. i. 5.

Hills of the N. Circars, in Ganjam and Vizagapatam, up to 3,000 ft.

2. *Naravelia*, DC.

Climbing shrubs. *Leaves* 3-foliolate, terminal leaflet usually transformed into a tendril. *Flowers* axillary or in terminal panicles, normally ♀. *Sepals* 4-5. *Petals* 6-12, narrow, usually elongating after the fall of the calyx. *Stamens* many. *Achenes* long, narrow, stalked, prolonged into a feathery style, which persists in fruit as a twisted pilose tail.

NARAVELIA ZEYLANICA, DC. ; F. B. I. i. 7 ; W. & A. 2 ; Roxb. Cor. Pl. ii. t. 188.

A climbing shrub with ovate-lanceolate downy sepals and elongated linear-clavate yellow petals. Fruit a head of linear achenes ending in twisted feathery tails.

Common in hedges and thickets in nearly all Districts.

3. *Anemone*, Linn.

Perennial herbs. *Leaves* radical, more or less cut or lobed. *Flowers* single or several together on simple or branched scapes; involucre 3-partite; bracts free or connate. *Sepals* 4–20, petaloid, imbricate. *Petals* 0. *Stamens* numerous, outer sometimes petaloid. *Carpels* many, 1-ovuled; ovules pendulous. *Fruit* a head of sessile achenes, with short or long, hooked or straight, naked or bearded, styles.

ANEMONE RIVULARIS, Ham.; F. B. I. i. 9. *A. dubia*, Wall.; W. & A. 3. *A. Wightiana*, Wall.; W. & A. 3; Wt. Ic. t. 936.

A strong perennial herb with rootstock sheathed in fibres. *Leaves* radical, long-petioled, 3-partite. *Flowers* about 1 in. in diam., sepals white within, blue outside or sometimes pink or yellow. *Achenes* glabrous with hooked styles.

Hills of the W. Gháts, especially in the Nilgiris, Anamalais and Pulneys, usually above 6,000 ft.

4. *Thalictrum*, Linn.

Erect, stiff, perennial herbs. *Leaves* compound; petioles sheathing, often auricled or stipuled. *Flowers* in panicles or racemes, often polygamous, not involucrate. *Sepals* 4–5, petaloid, imbricate in bud. *Petals* 0. *Stamens* many. *Carpels* few or numerous; ovule 1, pendulous. *Fruit* a head of small sessile or stalked achenes; style persistent or deciduous.

Leaves more than three times ternately divided, leaflets mostly cuneate, obtuse at base; flowers white; achenes .2 in. long (with style) forming a loose head:—

Beak of achene $\frac{1}{3}$ of seed-bearing part1. *javanicum*.

Beak of achene equal to seed-bearing part2. *saniculæforme*.

Leaves once or twice ternately divided; leaflets mostly orbicular, cordate; flowers white; achenes .1 in. (with style) forming a small compact globe3. *Dalzellii*.

1. THALICTRUM JAVANICUM, Bl.; F. B. I. i. 13. *T. glyphocarpum*, W. & A. 2; Wt. Ic. t. 48.

Mahendragiri Hill in Ganjam; W. Ghát Range, usually at over 6,000 ft.

2. THALICTRUM SANICULÆFORME, DC.; F. B. I. i. 13.

Hills of W. Gháts in Mysore and Nilgiris, scarce.

3. *THALICTRUM DALZELLII*, Hook.; F. B. I. i. 13.

Mysore, in the Bababudan Hills.

5. *Ranunculus*, Linn.

Annual or perennial, land or water herbs. *Leaves* entire, lobed or dissected; stipules membranous or 0. *Flowers* white or yellow, single or paniced. *Sepals* 3-5, deciduous or caducous, imbricate. *Petals* 5 or rarely more, very rarely 0, often bearing a nectary near the base. *Stamens* many. *Fruit* a head or spike of beaked or apiculate achenes.

Achenes not compressed, oblong-globose; leaves long-stalked, oval or orbicular, coarsely crenate only, usually cordate; flowers yellow

1. *reniformis*.

Achenes compressed; leaves deeply divided:—

Achenes finely and evenly pitted; sepals spreading; petals yellow

2. *subpinnatus*.

Achenes tubercled or muricate; sepals reflexed:—

Achenes 5 times longer than their beak, with a few blunt tubercles; petals yellow.....3. *Wallichianus*.

Achenes only slightly longer than beak, with prominent, usually numerous and spiny tubercles; petals yellow4. *muricatus*.

1. *RANUNCULUS RENIFORMIS*, Wall.; F. B. I. i. 16; W. & A. 3; Wt. Ill. i. t. 2, Ic. t. 75.

Higher hills of the W. Gháts, usually at over 6,000 ft.

2. *RANUNCULUS SUBPINNATUS*, W. & A. 4; Wt. Ic. t. 49.

W. Gháts, in the Nilgiris and Pulneys, at over 6,000 ft.

3. *RANUNCULUS WALLICHIANUS*, W. & A. 4; F. B. I. i. 20; Wt. Ic. t. 937.

W. Gháts, common, usually at over 6,000 feet.

4. *RANUNCULUS MURICATUS*, Linn.; F. B. I. i. 20.

Nilgiris, banks of Ootacamund Lake at 7,000 ft.

Family II. DILLENACEAE.

Trees, shrubs or herbs, sometimes climbing. *Leaves* alternate, simple, entire, toothed or rarely pinnatipartite; petioles with sheaths and without stipules or without sheaths and with lateral deciduous stipules. *Flowers* yellow or white, sometimes very large. *Sepals* 5, imbricate, persistent. *Petals* (3-5), deciduous,

Stamens in many hypogynous series; anthers innate with lateral or apical dehiscence. *Carpels* 1 or more, free or joined at the axis; styles quite distinct; ovules amphitropous, solitary or few, and ascending or many, and attached to the ventral suture. *Fruit* follicular or indehiscent and sub-baccate. *Seeds* 1-many, with an aril, testa crustaceous, raphe short, albumen fleshy; embryo next the hilum, minute.

Herbs, usually stemless, with large radical leaves1. **Acrotrema**.
Trees or climbing shrubs:—

Stamens with filaments thickened upwards and oblique anther cells; fruit of several shining follicles.....2. **Tetracera**.

Stamens with cylindric filaments and parallel anther cells; fruit globose, enclosed in the enlarged fleshy calyx.....3. **Dillenia**.

1. **Acrotrema**, Jack.

Herbs, usually stemless with woody rhizomes. *Leaves* large, parallel-nerved, entire, toothed or pinnatipartite, with deciduous sheathing stipules. *Scape* short, axillary, many-bracteolate. *Flowers* large, yellow. *Sepals* and *petals* 5 each. *Stamens* numerous, in 3 bundles, which alternate with the carpels; filaments thread-like; anthers erect, dehiscing from the middle to the top. *Carpels* 3, slightly cohering at the axis; styles subulate, recurved; ovules 2 or more. *Follicles* 3, bursting irregularly. *Seed* solitary; aril membranous; testa crustaceous, pitted.

ACRO TREMA ARNOTTIANUM, Wight; F. B. I. i. 32.

Stem short, rarely none or elongated; leaves obovate-oblong, blunt, sharply toothed, 6–12 in. long; scape many-flowered, axis long or abbreviated.

Forests of W. Ghâts in Travancore and Tinnevely, at 1,000–3,000 ft.

2. **Tetracera**, Linn.

Climbing shrubs or trees, scabrid or pubescent. *Leaves* with parallel main nerves. *Flowers* in terminal or lateral panicles, hermaphrodite or sometimes unisexual. *Sepals* 4–6, spreading. *Petals* 4–6. *Stamens* many, with filaments dilated upwards and distant anther-cells. *Carpels* 3–5; ovules many, in 2 rows. *Follicles* coriaceous, shining. *Seeds* 1–5, with a fimbriate or toothed aril.

TETRACERA LAEVIS, Vahl; F. B. I. i. 31. *T. Rheedii*, DC.; W. & A. 5; Wt. Ic. t. 70.

A glabrous climbing shrub with smooth leaves; sepals glabrous outside, silky within, broadly oval; petals white; follicles 1-2-seeded.

Forests of Malabar and Travancore.

3. Dillenia, Linn.

Trees. *Leaves* large, with conspicuous parallel main nerves. *Flowers* large, solitary or fascicled, yellow or white. *Sepals* 5, spreading. *Petals* 5, broad. *Stamens* cohering slightly at the base; anthers linear, dehiscing by pores or small slits; inner erect or recurved, introrse, outer recurved, extrorse. *Carpels* 5-20, cohering at the axis; ovules numerous. *Fruit* globose, comprising the matured indehiscent carpels and the enveloping thickened fleshy calyx; seeds not arillate.

Flowers 2-3 in. across, in few-flowered racemes; sepals silky; leaves ovate-oblong, crenate:—

Leaves blunt at top, cuneate at base, serrate, glabrous; petals narrow, spathulate; twigs and peduncles nearly glabrous1. *retusa*.

Leaves blunt at base, crenate, pubescent, at least on the nerves; petals broadly obovate; twigs and peduncles very silky2. *bracteata*.

Flowers 1 or 6 in. across, solitary or fascicled on the old wood; sepals glabrous; leaves oblong-lanceolate, serrate:—

Flowers white, solitary, 6 in. across, terminal, appearing with the leaves; leaves under 1 ft. long3. *indica*.

Flowers yellow, clustered on nodes of the old wood, 1 in. across, appearing before the leaves; leaves often 2 ft. long...4. *pentagyna*.

1. DILLENNIA RETUSA, Thunb.; F. B. I. i. 37; W. & A. 6. *Wormia bracteata*, Bedd. Fl. t. 115 (not of Wight).

Forests of the Bolampatti and Anamalai Hills in Coimbatore District.

A large and ornamental tree, scarce in the Peninsula.

2. DILLENNIA BRACTEATA, Wt. Ic. t. 358; F. B. I. i. 37.

Dry forests of the Nilgiris, Mysore, North Arcot and Chingleput, not common.

3. DILLENNIA INDICA, Linn.; F. B. I. i. 36. *D. speciosa*, Thunb.; W. & A. 5; Wt. Ic. t. 823; Bedd. Fl. t. 103.

Damp valleys of the hills of the N. Circars; also in

the Malabar Gháts; often cultivated in gardens and near temples.

A beautiful evergreen tree. Vern. *Hind.* Chalta; *Ur.* Rai; *Tel.* Pedda Kalinga; *Tam.* Uva; *Mal.* Syalita; *Mar.* Mota Karmal.

4. *DILLENIA PENTAGYNA*, Roxb. Cor. Pl. i. t. 20; F. B. I. i. 38; W. & A. 5; Bedd. Fl. t. 104.

Dry forests and grass lands in most Districts, common and conspicuous both in leaf and in flower.

A deciduous tree. Vern. *Ur.* Rai; *Tel.* Chinna Kalinga; *Tam.* Nai-tékku; *Mal.* Koddapanna.

Family III. MAGNOLIACEAE.

Trees or shrubs, sometimes climbing, often aromatic. *Leaves* alternate, entire or rarely toothed; stipules convolute or 0. *Flowers* axillary and terminal, sometimes unisexual, white yellow or red, often showy and fragrant. *Sepals* and *petals* similar, very deciduous, arranged in whorls of 3. *Stamens* very numerous or rarely as few as 5, hypogynous, filaments free or monadelphous; anthers adnate, basifixed, dehiscing longitudinally. *Carpels* indefinite, free or cohering to an elongated axis or in one whorl; styles usually short, stigmatose on the inner surface; ovules anatropous or amphitropous, 2 or more on the ventral suture. *Fruit* baccate, follicular or of woody dehiscent carpels which are sometimes arranged in a cone. *Seeds* 1 or few, sometimes pendulous from a long funicle; testa single and crustaceous or double with the outer part fleshy; albumen granular or fleshy and oily; embryo minute; cotyledons spreading; radicle short, blunt, next the hilum.

Trees with perfect flowers and oblong spikes of leathery dehiscent carpels1. *Michelia*.
Climbers with unisexual flowers and globular fleshy fruits...2. *Kadsura*.

1. *Michelia*, Linn.

Trees. *Leaves* evergreen or deciduous, enveloped in bud in their connate, convolute stipules. *Flowers* solitary, axillary or terminal. *Sepals* and *petals* similar, 9-15 or more, in 3 or more rows. *Stamens* numerous, many-seriate, with flat filaments;

anthers adnate, introrse. *Carpels* in a loose stalked spike; stigma decurrent; ovules 2 or more. *Fruit* a lax or dense spike of coriaceous dorsally dehiscent carpels. *Seeds* pendulous from the carpels by a long thread; outer wall of testa fleshy; albumen oily.

Leaves more than 4 in. long, gradually narrowed upwards from below the middle; flowers yellow1. *Champaca*.
 Leaves 2-4 in. long, shortly acuminate; flowers white, sometimes with a tinge of yellow2. *nilagirica*.

1. *MICHELIA CHAMPACA*, Linn.; F. B. I. i. 42; W. & A. 6; King Ann. Calc. iii. 216, t. 64; Brand. For. Fl. t. 1.

Evergreen forests of the W. Gháts, in Mysore, Coorg, the Anamalais and Pulneys and Travancore; perhaps also occasionally in the hills of the N. Circars; elsewhere much cultivated, especially about temples for the sake of its flowers.

A tall evergreen tree with a valuable yellowish wood. Vern. *Hind.* Champa; *Tel.* Champakam; *Tam.* Shembuga, Chambugam.

2. *MICHELIA NILAGIRICA*, Zenk.; F. B. l. i. 44; Wt. Ic. t. 938; Bedd. Fl. t. 62; King Ann. Calc. iii. 216, t. 65.

Shola forests of the Nilgiris, Anamalais and Pulneys above 5,000 ft.

A handsome tree with a yellowish wood, valuable for carpentry work. Vern. *Tam.* Shembuga.

2. *Kadsura*, Kaempfer.

Climbing glabrous shrubs. *Leaves* exstipulate. *Flowers* unisexual, white, yellow or reddish, axillary or in the axis of scales near the base of short lateral leafy branches or from the old wood. *Sepals* and *petals* 9 to 12 in all, imbricate in about 3 rows. *Male flowers* with 5-15 or more *stamens* in a spiral series; filaments very short, free or subconnate, often fleshy; anthers free or partly immersed in a fleshy head of confluent filaments; cells small distant. *Female flowers* with many densely imbricated ovaries; stigmas sessile; ovules 2-4. *Fruit* a globose head of indehiscent fleshy 1-seeded carpels. *Seeds* 1-2, suspended; albumen fleshy; testa crustaceous; embryo minute.

KADSURA ROXBURGHIANA, Arn. ; F. B. I. i. 45 ; King Ann. Calc. iii. 222, t. 73A. *K. Wightiana*, Arn. ; F. B. I. i. 45.

Petals roundish, concave, outer larger ; berries cuneate globose, scarlet.

Forests of the W. Gháts, in Malabar.

Family IV. ANONACEAE.

Trees or shrubs often climbing and frequently aromatic. *Leaves* alternate, simple, entire, penninerved, more or less distichous ; stipules 0. *Flowers* 2- or rarely 1-sexual, greenish purple, red, brown or yellow. *Sepals* 3 or rarely 2, free or connate. *Petals* 6, usually thick and fleshy, generally biseriate, hypogynous, valvate or slightly imbricate, the inner sometimes absent, very rarely coherent. *Stamens* many, closely packed on the torus or rarely few in one whorl ; filaments short or 0 ; anthers adnate, bilocular with dorsal or lateral, contiguous or distant cells, with longitudinal dehiscence ; connective produced into an oblong or truncate head. *Carpels* numerous or rarely few or solitary, distinct or rarely coherent with distinct stigmas, sessile on the top of the torus ; styles short or 0 ; ovules one or more, anatropous. *Fruit* of 1 or more distinct sessile or stalked 1- or many-seeded, usually indehiscent, carpels or rarely of several carpels cohering together in a 1- or many-locular, dry or fleshy, dehiscent or indehiscent fruit. *Seeds* with abundant ruminant albumen and a minute basal embryo with divaricate cotyledons.

Petals imbricate in bud (Tribe i. **UVARIEAE**) :—

Stamens with connectives produced and not concealing the anthers ; trees.....1. **Sageraea**.

Stamens with anthers concealed by the overlapping connectives ; climbing shrubs.....2. **Uvaria**.

Petals valvate or open in bud :—

Anther-cells concealed by the overlapping connectives :—

Outer petals spreading, flat or only concave at the base :—

Inner petals spreading like the outer or none (Tribe ii. **UNONEAE**) :—

Petals bent in at the base over the stamens and ovaries, then spreading :—

Peduncles not hooked, carpel 1, many-ovuled

3. **Cyathocalyx**.

Peduncles hooked, carpels many, 1-2-ovuled...4. **Artabotrys**.

Petals flat, spreading from the base:—

Ovules 2–6, in one row on the ventral suture; carpels 2- or more-seeded.....5. **Unona.**

Ovules 1 or 2, basal; carpels baccate, 1-seeded...6. **Polyalthia.**

Inner petals dissimilar to the outer, arching over the stamens and ovaries and meeting at their tips (Tribe iii. **MITREPHOREAE**):—

Inner petals without claws:—

Inner petals as large as the outer but not larger, tomentose outside7. **Popowia.**

Inner petals much larger than outer, glabrous

8. **Phaeanthus.**

Inner petals clawed and connivent in a vaulted cone:—

Ovules 1 or 2; largest leaves 6–11 inches, smooth

9. **Goniothalamus.**

Ovules 4 or more; largest leaves 4–5 inches, reticulate

10. **Mitrephora.**

Outer petals thick, rigid, connivent; inner similar but smaller or 0 (Tribe iv. **XYLOPIAEAE**):—

Fruit of confluent carpels, fleshy, globose11. **Anona.**

Fruit of distinct spreading carpels12. **Xylopia.**

Anther-cells not concealed by the overlapping connectives (Tribe v.

MILIUSEAE):—

Outer petals shorter than inner:—

Inner petals flat, or if a little pouched then glabrous; ovules definite (1–2); leaves glabrous or, if tomentose, inner petals glabrous within13. **Milusa.**

Inner petals pouched at base, pubescent on both surfaces; ovules

6 or more; leaves tomentose14. **Saccopetalum.**

Outer petals equal to inner; ovules 4–815. **Alphonsea.**

Outer petals longer than inner; ovules 2–4.....16. **Orophea.**

1. *Sageraea*, Dalz.

Trees. *Leaves* shining and branches glabrous. *Flowers* small, terminal, axillary or fascicled on woody tubercles, 1–2-sexual. *Sepals* orbicular or ovate, imbricate. *Petals* 6, imbricate in 2 rows, nearly equal, usually orbicular, concave. *Stamens* 6–21, imbricate in 2 or more series, broadly oblong, thick, fleshy; anther cells dorsal, oblong; connectives produced, not concealing the anthers. *Ovaries* 3–6; style short, stigma obtuse or capitate; ovules 1–8 on the ventral suture. *Fruit* of stalked globose carpels.

- Larger petals .25 in. long; stamens about 25; leaves 5-7 in. long
1. *Dalzellii*..
- Larger petals .5 in. long; stamens about 12; leaves 9-12 in. long
2. *grandiflora*..

1. *SAGERAEA DALZELLII*, Bedd. Ic. t. 42. *Bocagea Dalzellii*,
Hook. f. & Th.; F. B. I. i. 92 *in part*.

Moist forests of W. Gháts in Malabar, the Anamalais,
Travancore and Tinnevely, up to 2,000 ft.

An evergreen tree with black bark. Vern. *Mal.* Mauja
nára, Kána Kaitha.

2. *SAGERAEA GRANDIFLORA*, Dunn in Kew Bull. 1914, 182.
Forests of Travancore.

2. *Uvaria*, Linn.

Scandent or straggling shrubs, usually stellately pubescent.
Inflorescence terminal or leaf opposed or rarely axillary. *Flowers*:
solitary, cymose, umbellate or fascicled, yellow, purple or brown..
Sepals 3, valvate, often connate below. *Petals* 6, orbicular, oval
or oblong, imbricate in 2 rows, sometimes connate at the base..
Stamens indefinite; top of connective ovoid-oblong, truncate or
subfoliaceous, concealing the anthers. *Torus* depressed, pubes-
cent or tomentose. *Ovaries* indefinite, linear-oblong; style short,
thick; ovules many, 2-seriate, rarely few- or 1-seriate. *Fruit* of
many dry or baccate, few- or many-seeded carpels.

Leaves, twigs, calyx and petals stellate-tomentose:—

Calyx smooth and soft.....1. *Hamiltonii*..

Calyx granular:—

Calyx globose splitting irregularly.....2. *eucincta*..

Calyx of 3 acuminate sepals3. *macropoda*..

Leaves glabrous:—

Leaves 2.2-3 in. long; flowers .6-.8 in. across; carpels subsessile,
blunt at both ends4. *zeylanica*.

Leaves 3-9 in. long; flowers 1-1.5 in. across, yellow; carpels on
slender pedicels, red5. *Narum*.

1. *UVARIA HAMILTONII*, Hook. f. & Thoms.; F. B. I. i. 48; King
Ann. Calc. iv. 17, t. 6.

Hill forests of Ganjam, up to 2,000 ft,

2. *UVARIA EUCINCTA*, Bedd. ex Dunn in Kew Bull. 1914, 182.

Hill forests of Ganjam, about 2,000 ft.

3. *UVARIA MACROPODA*, Hook. f. & Thoms.; Bedd. Ic. t. 79; F. B. I. i. 50; King Ann. Calc. iv. 27, t. 20.

Hill forests of Ganjam, about 2,000 ft.; hills of S. Arcot.

4. *UVARIA ZEYLANICA*, Linn.; F. B. I. i. 51; Bedd. Ic. t. 78; King Ann. Calc. iv. 26, t. 19. *U. Heyneana*, W. & A. 8.

Forests of the W. Gháts, in the Anamalais, Pulneys and Travancore.

5. *UVARIA NARUM*, Wall.; F. B. I. i. 50; W. & A. 9; Wight Ill. i. t. 6; King Ann. Calc. iv. 27, t. 21. *U. Hookeri*, King Ann. Calc. iv. 28, t. 22.

Forests of the W. Gháts, from S. Canara to Travancore; hills of Salem, up to 4,000 ft.; common.

3. *Cyathocalyx*, Champ.

Trees. *Leaves* glabrous. *Flowers* in terminal or leaf-opposed fascicles. *Sepals* combined into a 3-lobed cup or nearly free. *Petals* in 2 whorls of 3 each, valvate, arching at the base over the stamens and pistils but above them flat and spreading. *Stamens* numerous, cuneate, truncate; anther-cells linear, dorsal. *Ovaries* usually solitary on a concave torus; stigma large peltate; ovules many. *Ripe carpels* large globose berries.

CYATHOCALYX ZEYLANICUS, Champ.; Bedd. Ic. t. 47; F. B. I. i. 53; King Ann. Calc. iv. 36, t. 42.

Moist forests on the slopes of the W. Gháts in S. Canara, Malabar, Anamalais and Travancore, up to 3,000 ft.

A moderate-sized evergreen tree.

4. *Artabotrys*, R. Br.

Climbing or straggling shrubs. *Leaves* shining. *Flowers* solitary or fascicled, usually on woody hooked recurved branches (peduncles). *Sepals* 3, valvate. *Petals* 6, in 2 whorls, bases concave, connivent, spreading above, limb flat, subterete or clavate. *Stamens* oblong or cuneate; connective truncate or produced, concealing the dorsal anther-cells. *Torus* flat or convex. *Ovaries* few or many; style oblong or columnar; ovules 2, erect, collateral. *Fruit* a circle of usually yellow, sometimes odorous, berries.

Leaves oblong-lanceolate; mature petals yellow, thinly adpressed-silky; fruit orange1. *odoratissimus*.
 Leaves oval-oblong; mature petals tomentose2. *zeylanicus*.

1. *ARTABOTRYS ODORATISSIMUS*, R. Br.; F. B. I. i. 54; W. & A. 10; King Ann. Calc. iv. 44, t. 55.

Cultivated in gardens, especially on the W. Coast, the flowers very fragrant. King considers it truly wild in S. India.

2. *ARTABOTRYS ZEYLANICUS*, Hook. f. & Thoms.; F. B. I. i. 54; Bedd. Ic. t. 48; King Ann. Calc. iv. 43, t. 53.

Evergreen forests of the W. Coast and W. Gháts, S. Canara to Travancore.

5. *Unona*, Linn.

Trees or shrubs, erect or climbing. *Flowers* often solitary, axillary, terminal or leaf-opposed. *Sepals* 3, valvate. *Petals* 6, valvate or open in aestivation, 2-seriate; 3 inner sometimes absent. *Torus* flat or slightly concave. *Stamens* cuneate; anther-cells linear, extrorse; top of connective subglobose or truncate, concealing the anthers. *Ovaries* numerous; style ovoid or oblong, recurved, grooved; ovules 2-8, 1-seriate (rarely sub-2-seriate). *Fruit* a ring of many carpels, elongate or constricted between the seeds or baccate. *Seeds* few or many.

A small tree. Flowers subsessile; petals oblong-lanceolate, densely tomentose, glabrescent; carpels sessile or subsessile; leaves lanceolate, dark green, nerves sunk above, raised beneath:—

Carpels soft, velvety, globose1. *pannosa*.

Carpels solid, glabrescent, slightly torulose2. *Ramarowii*.

Flowers on slender peduncles; petals linear or narrowly lanceolate, slightly silky; carpels glabrous, stalked:—

A large climber. Young shoots rufous; petals narrow-lanceolate; sepals over .75 in. long; peduncle with a cordate bract...3. *viridiflora*.

A large shrub. Young shoots glabrous; petals narrow-linear; sepals less than .5 in. long4. *Lawii*.

1. *UNONA PANNOSA*, Dalz.; F. B. I. i. 58; Bedd. Ic. t. 52; King Ann. Calc. iv. 55, t. 72.

Forests of the W. Gháts in Malabar, Anamalais, Travancore and Tinnevely, at 2,000 to 4,500 ft.

A small tree reaching 30 ft. in height, common in Travancore.

2. *UNONA RAMAROWII*, Dunn in Kew Bull. 1914, 183.

Forests of the W. Gháts from S. Canara to Travancore, up to 4,000 ft.

3. *UNONA VIRIDIFLORA*, Bedd. Ic. t. 158; F. B. I. i. 60; King Ann. Calc. iv. 56, t. 75.

Anamalai Hills, banks of Sholayar river, at 3,000 ft., scarce.

4. *UNONA LAWII*, Hook. f. & Thoms.; F. B. I. i. 59; Bedd. Ic. t. 73; King Ann. Calc. iv. 57, t. 77A.

Forests of the W. Gháts in Mysore, Wynaad, Travancore and Tinnevely, at 2,000 to 3,000 ft.

6. *Polyalthia*, Blume.

Trees or erect or climbing shrubs. *Flowers* solitary or fascicled, axillary, terminal, leaf-opposed or below the leaves on the young or old wood. *Sepals* free, valvate or subimbricate. *Petals* 6, 2-seriate, ovate or elongated, flat or the inner vaulted. *Torus* convex. *Stamens* cuneate; anther-cells extrorse, remote, concealed below the overlapping connectives. *Ovaries* indefinite; style usually oblong; ovules 1-2, basal and erect or sub-basal and ascending. *Fruit* a ring of one-seeded berries.

Flowers in fascicles, umbels or cymes:—

Flowers green, in fascicles or umbels; petals .7-1 in. long; leaves narrow-lanceolate, 7-9 in. long, margins undulate1. *longifolia*.

Flowers yellow, in cymes; petals 1.5 in. long; leaves elliptic; nerves close, numerous, ascending; carpels ash-coloured 2. *fragrans*.

Flowers solitary, occasionally many, on tubercles of the trunk, but then not closely fascicled:—

Leaves glabrous or nerves puberulous beneath:—

Leaves attenuate or acuminate at top:—

Leaves 2.5-3.5 in. long, boldly reticulate3. *Korinti*.

Leaves up to 8.5 in. long, slightly reticulate; nerves ascending, 12-16 pairs:—

Leaves gradually attenuate; twigs glabrous; petals greenish-yellow, over 1 in. long.....4. *coffeoides*.

Leaves acuminate; twigs rufous-pubescent; petals .5 in. long

5. *rufescens*.

Leaves rounded at top or very obtuse; nerves spreading; bark corky; flowers pale green or yellow; berries purple6. *suberosa*.

Leaves pubescent below, acute or acuminate, nerves ascending; flowers green; berries red7. *cerasoides*.

1. *POLYALTHIA LONGIFOLIA*, Hook. f. & Thoms.; F. B. I. i. 62
Bedd. Fl. t. 38. *Guatteria longifolia*, Wall.; W. & A. 10
Wt. Ic. t. 1; King Ann. Calc. iv. 72, t. 99.

Cultivated in gardens and avenues and near temples, native of Ceylon.

A handsome evergreen tree, easily recognized. Vern. *Hind.* Asok, Devidari; *Tam.* Assothi; *Mal.* Choruna.

2. *POLYALTHIA FRAGRANS*, Bedd. Ic. t. 54, and Fl. t. 74; F. B. I. i. 63; King Ann. Calc. iv. 72, t. 100A.

Forests of the W. Gháts in S. Canara, Malabar, Anamalais and Travancore, up to 4,000 ft.

A tall, straight, handsome tree, the wood used on the W. Coast for the masts of native craft. Vern. *Tam.*, *Mal.* Nedunar.

3. *POLYALTHIA KORINTI*, Hook. f. & Thoms.; F. B. I. i. 64
King Ann. Calc. iv. 79, t. 110A. *Guatteria Korinti*, Dunal
W. & A. 10; Wt. Ic. t. 398.

Forests of the E. Gháts and hills from Vizagapatam southwards to Tinnevely and Travancore.

A spreading shrub, scarce.

4. *POLYALTHIA COFFEOIDES*, Hook. f. & Thoms.; F. B. I. i. 62
King Ann. Calc. iv. 67, t. 91.

Forests of the W. Gháts in S. Canara, Coorg, Malabar, Nilgiris and Travancore, up to 4,000 ft.

A handsome evergreen tree with straight trunk, conspicuously studded with the flower-tubercles, the leaves coming out red at first. Vern. *Tam.* Nedunarai; *Mal.* Villa.

5. *POLYALTHIA RUFESCENS*, Hook. f. & Thoms.; F. B. I. i. 66;
King Ann. Calc. iv. 83, t. 116 (tris).

W. Coast forests in Cochin and Travancore.

A tree with tomentose branches, scarce.

6. *POLYALTHIA SUBEROSA*, Hook. f. & Thoms.; F. B. I. i. 65;
King Ann. Calc. iv. 64, t. 77B. *Uvaria suberosa*, Roxb.
Cor. Pl. i. t. 34. *Guatteria suberosa*, DC.; W. & A. 10.

Dry forests of the N. Circars and E. Gháts from Ganjam southwards, also in the Deccan forests of Kurnool, Mysore and Coimbatore, and occasionally on the W. Coast.

A small evergreen corky-barked tree or large shrub, very common, except on the west side. Vern. *Ur.* Karadia; *Tel.* Chilka dúdúga.

7. *POLYALTHIA CERASOIDES*, Hook. f. & Thoms.; F. B. I. i. 63; Bedd. Fl. t. 1; King Ann. Calc. iv. 65, t. 86B. *Uvaria cerasoides*, Roxb. Cor. Pl. i. t. 33. *Guatteria cerasoides*, W. & A. 10.

Forests of almost all Districts, especially in the N. Circars and Deccan, up to 3,000 ft., less common in the W. Gháts. An evergreen tree. Vern. Mar. Hoom; Tel. Gutti; Tam. Nakulsi.

7. *Popowia*, Endl.

Trees. *Flowers* small, subglobular, opening but slightly, usually hermaphrodite, sometimes polygamous, extra-axillary or leaf-opposed. *Sepals* 3, ovate, valvate. *Petals* 6, valvate, in two whorls (the inner series very rarely imbricate), more or less orbicular; outer, like the sepals, spreading; inner thick, concave, connivent, acute, the tip sometimes inflexed. *Stamens* indefinite or subdefinite, short, cuneate; anther-cells hidden beneath the overlapping connectives, dorsal, remote. *Carpels* about 6, ovoid; style large, oblong or subclavate, straight or recurved; ovules 1-2 on the ventral suture, rarely 1 basal erect. *Fruit* a ring of stalked, globose or ovoid berries.

POPOWIA BEDDOMEANA, Hook. f. & Thoms.; F. B. I. i. 68; King Ann. Calc. iv. 119, t. 160B. *P. ramosissima*, Bedd. Ic. t. 75.

A small tree; leaves 2-3 in. long, glabrous, granulate beneath; flowers small, solitary; petals tomentose without.

Evergreen forests of the W. Gháts in S. Travancore and Tinnevely, at 3,000 to 5,000 ft. A small tree, scarce.

8. *Phaeanthus*, Hook. f. & Thoms.

Trees or climbers. *Flowers* solitary, terminal or in extra-axillary fascicles. *Sepals* 3, small, valvate. *Petals* 6, valvate, in 2 whorls; outer small, like the sepals; inner large, flat, coriaceous. *Stamens* numerous, oblong or quadrate, truncate; anther-cells dorsal, distant. *Carpels* numerous; styles cylindric or clavate, sometimes grooved ventrally. *Ovules* 1-2, sub-basal, ascending. *Fruit* of stalked, 1-2-seeded carpels

PHAEANTHUS MALABARICUS, Bedd. Ic. t. 76; F. B. I. i. 72; King Ann. Calc. iv. 154, t. 201B.

A small tree; leaves glabrous except the midrib below,

oblong-lanceolate, taper-pointed; flowers .5-7 in. across, red.

Forests of the W. Gháts, in Wynaad at about 2,000 ft., abundant about Tambachari Ghát (Bedd.).

9. *Goniothalamus*, Blume.

Trees or shrubs. *Leaves* with small nerves, forming intra-marginal loops. *Flowers* solitary or fascicled, axillary or extra-axillary; peduncles with basal scaly distichous bracts. *Sepals* 3, valvate. *Petals* 6, valvate, in two whorls; outer thick, flat or nearly so; inner smaller, shortly clawed, cohering in a vaulted cap over the stamens and ovary. *Stamens* many, linear-oblong; anther-cells remote, dorsal, hidden by the connective, which is produced into an oblong or truncate process. *Ovaries* many; style simple or 2-fid; ovules solitary or 2 (or rarely 4), superposed, sub-basal. *Fruit* of many 1-seeded carpels.

Outer petals softly brownish pubescent on both sides; stigma 2-fid:—

Outer petals clawed, hooded; leaves oblong, 6-9 in. long; small tree

1. *cardiopetalus*.

Outer petals ovate, flat; leaves linear-lanceolate, 3-8 in. long; small tree

.....2. *Wightii*.

Outer petals subglabrous; stigma entire or 2-lobed:—

Style subulate; leaves oblong-lanceolate, 3.5-6 in. long; veins obscure; small trees:—

Petals less than twice as long as the sepals; anthers beaked

3. *rhynchantherus*.

Petals five times as long as the sepals; anthers truncate

4. *Thwaitesii*.

Style 2-lobed; leaves 8-11 in. long; veins prominent beneath; shrub or tree

.....5. *wynaadensis*.

1. *GONIOTHALAMUS CARDIOPETALUS*, Hook. f. & Thoms.; F. B. I. i. 75; Bedd. Ic. t. 62; King Ann. Calc. iv. 93, t. 129.

W. Gháts in S. Canara, Coorg, Wynaad, Anamalais; Shevaroy Hills, at 2,500 to 4,000 ft.

2. *GONIOTHALAMUS WIGHTII*, Hook. f. & Thoms.; F. B. I. i. 76; Bedd. Ic. t. 63; King Ann. Calc. iv. 92, t. 122b.

W. Gháts in the Anamalais, Travancore and Tinnevely at 3,000 to 5,000 ft., in evergreen forests.

3. *GONIOTHALAMUS RHYNCHANOTHERUS*, Dunn in Kew Bull. 1914, 182.

W. Gháts, in Tinnevelly and Travancore, in dense forest.

4. *GONIOTHALAMUS THWAITESII*, Hook. f. & Thoms.; F. B. I. i. 72; Bedd. Ic. t. 58; King Ann. Calc. iv. 88, t. 121.

W. Gháts of S. Travancore and Tinnevelly at 2,000 to 4,000 ft., in moist forests.

5. *GONIOTHALAMUS WYNAADENSIS*, Bedd. Ic. t. 61; F. B. I. i. 74; King Ann. Calc. iv. 92, t. 128.

W. Gháts, in Wynaad about Devala and Cherambadi, at 2,500 to 3,500 ft.

10. *Mitrephora*, Blume.

Trees. *Leaves* coriaceous, strongly nerved, plaited in vernation. *Flowers* usually terminal or leaf-opposed, sometimes 1-sexual. *Sepals* 3, orbicular or ovate. *Petals* 6, 2-seriate, valvate; outer ovate, thin veined; inner clawed, vaulted and cohering. *Stamens* oblong-cuneate; anther-cells dorsal, remote, the connectives broadly truncate at the apex, hiding the anther-cells. *Ovaries* oblong; style oblong or clavate, ventrally furrowed; ovules 4 or more, 2-seriate. *Fruit* of globose or ovoid, stalked or subsessile, carpels.

A large tree. Leaves with woolly tufts in the forks of the nerves beneath, 4-5 in. long; stigma club-shaped; flowers 2-3 in. across, outer petals white, inner spotted with crimson.....1. *grandiflora*.

A small tree. Leaves glabrous, 2-4 in. long; stigma globular, sessile; flowers 1.5 in. across, yellow2. *Heyneana*.

1. *MITREPHORA GRANDIFLORA*, Bedd. Ic. t. 101, and Fl. t. 75; F. B. I. i. 78; King Ann. Calc. iv. 112, t. 155.

Forests of the W. Gháts in S. Canara, at about 2,000 ft., Mysore and Wynaad.

2. *MITREPHORA HEYNEANA*, Thwaites; F. B. I. i. 77; Bedd. Ic. t. 77; King Ann. Calc. iv. 113, t. 152B. *Uvaria lutea*, β W. & A. 8.

Forests of the W. Gháts in the Nilgiris, Pulneys, Travancore and Tinnevelly, near the base of the hills, and up to 2,000 ft.

11. *Anona*, Linn.

Trees or shrubs. *Flowers* solitary or fascicled, terminal or leaf-opposed. *Sepals* 3, small, valvate. *Petals* 3-6, valvate, in 2

whorls, or the inner whorl wanting; outer triquetrous, base concave. *Stamens* numerous; anther-cells narrow, dorsal, contiguous, hidden by the overlapping ovoid tops of connectives. *Ovaries* many, subconnate; style oblong; ovule 1, erect. *Fruit* many-celled, ovoid or globose, many-seeded.

Leaves obtuse, 2-3 in. long, glaucous beneath; nerves ascending; flower greenish; fruit green, ovoid, with projecting ovoid areoles...1. *squamosa*. Leaves acuminate, 5-8 in. long, green beneath; nerves divergent; flowers pale green; fruit orange, subglobose, with flat, 5-cornered areoles

2. *reticulata*.

1. ANONA SQUAMOSA, Linn.; F. B. I. i. 78; W. & A. 7.

The West Indian "Sweet Sop," the "Custard Apple" of India.

Cultivated for its fruit, and now very widely spread in the vicinity of villages, temples and old forts. Vern. *Hind*. Sharipha, Sitaphal; *Tam*. Sita; *Tel*. Sita pandu.

2. ANONA RETICULATA, Linn.; F. B. I. i. 78; W. & A. 7.

The "Bullock's Heart" of India, the "Custard Apple" of the West Indies, also sometimes occurs in a naturalized state.

12. Xylopia, Linn.

Trees or shrubs. *Leaves* coriaceous. *Flowers* axillary, supra-axillary, or on nodes below the leaves, solitary, cymose or fascicled; buds triquetrous, conic, often slender. *Sepals* 3, valvate, connate or free. *Petals* 6, elongate, valvate, in two whorls; outer flat or concave; inner nearly as long, 3-gonous, concave at the base only. *Torus* flat, or hollow and enclosing the carpels. *Stamens* oblong, truncate or connective produced; anther-cells hidden under overlapping connectives, remote or continuous, usually septate with a large pollen grain in each cellule. *Ovaries* 1 or more; style long, clavate; ovules 2-6 or more, 1-2-seriate. *Fruit* a ring of long or short, continuous or moniliform, usually several-seeded carpels.

XYLOPIA PARVIFOLIA, Hook. f. & Thoms.; F. B. I. i. 84; Bedd. Ic. t. 43, and Fl. t. 172; King Ann. Calc. iv. 145, t. 190A.

A lofty but slender buttressed tree with narrow subsessile pubescent brown flowers; bracts longer than the sepals; leaves 2-3.5 in. long, reticulate.

Moist forests of Travancore up to 2,000 ft.

13. *Miliusa*, Lesch.

Trees or shrubs. *Flowers* 1-2-sexual, green or red, axillary or extra-axillary, solitary fascicled or cymose. *Sepals* 3, small, valvate. *Petals* 6, valvate, in 2 series; outer smaller, like the sepals; inner cohering when young by the margins, at length free. *Torus* elongated, cylindric. *Stamens* definite or indefinite; anthers subdidymous, cells contiguous, ovoid, extrorse, connective hardly apiculate. *Ovaries* indefinite, linear-oblong; style oblong or very short; ovules 1-2 (-3-4). *Fruit* a ring of globose or oblong 1-many-seeded carpels.

A moderate-sized tree, the whole plant tomentose; flower stalks 2-4 in. long; inner petals yellowish, glabrous within, flat (not saccate) at base; fruit purple1. *velutina*.

Leaves glabrous or pubescent only on the nerves beneath:—

A small tree; peduncles 1-1.5 in. long; carpels glabrous, on stalks .3-5 in. long; twigs early glabrous; stamens very numerous

2. *Wightiana*.

Shrubs; peduncles .3-8 in. long:—

Stamens very numerous; twigs pubescent or strigose; carpels short-stalked or sessile:—

Carpels grey-tomentose; twigs strigose3. *eriocarpa*.

Carpels glabrous; twigs pubescent.....4. *montana*.

Stamens 8-12; twigs glabrous; leaves narrow-lanceolate, nerves obscure.....5. *nilagirica*.

1. *MILIUSA VELUTINA*, Hook. f. & Thoms.; F. B. I. i. 87; Bedd.

Ic. t. 87, and Fl. t. 37: King Ann. Calc. iv. 158, t. 206.

Forests of the N. Circars from Ganjam to Godavari; Cuddapah District.

A common deciduous tree of the deciduous forests of N. and C. India, especially with Sál. It gives a useful wood. Vern. *Hind.* Domsal.

2. *MILIUSA WIGHTIANA*, Hook. f. & Thoms.; F. B. I. i. 87;

Bedd. Ic. t. 86; King Ann. Calc. iv. 156, t. 202B.

Forests of the W. Gháts in the Nilgiris, Coimbatore, Travancore and Tinnevely, up to 5,000 ft., evergreen.

3. *MILIUSA ERIOCARPA*, Dunn. *M. indica*, Hook. f. & Thoms.;

F. B. I. i. 86 (var. *tomentosa*), (not of Lesch.); Bedd. Ic. t. 85.

Forests of the W. Gháts in Mysore, Travancore and Tinnevely; Hills of Salem.

4. *MILIUSA MONTANA*, Gardn. ; Bedd. Ic. t. 84. *M. indica*, var. *montana*, Hook. f. & Thoms. ; F. B. I. i. 86.

Forests of the W. Gháts in Malabar, Nilgiris, Anamalais and Tinnevely, up to 4,500 ft. ; Cuddapah.

5. *MILIUSA NILAGIRICA*, Bedd. Ic. t. 88 ; F. B. I. i. 87 ; King Ann. Calc. iv. 156, t. 203A.

Forests of the W. Gháts in the Wynaad, Nilgiris and Anamalais, at about 5,000 ft.

14. *Saccopetalum*, Benn.

Trees. *Leaves* deciduous. *Flowers* axillary, solitary or fascicled. *Sepals* 3, small, valvate. *Petals* 6, valvate, in 2 whorls ; outer small, like the sepals ; inner much larger, erect or conniving, base saccate. *Stamens* indefinite ; anther-cells dorsal, contiguous, not concealed by the connective, which is produced into a conspicuous appendage. *Ovaries* indefinite ; ovules 6 or more. *Fruit* a ring of subglobose carpels.

SACCOPETALUM TOMENTOSUM, Hook. f. & Thoms. ; F. B. I. i. 88 ; Bedd. Ic. t. 49, and Fl. t. 39 ; Roxb. Cor. Pl. i. t. 35 ; King Ann. Calc. iv. 159, t. 207.

A large deciduous tree with twigs and under side of leaves tomentose ; flowers in small leaf-opposed or terminal cymes, on pedicels 2-3 in. long ; carpels large, globose, stalked, velvety brown.

Forests of the N. Circars, especially with Sál (Brandis) ; Hyderabad ; W. Gháts from S. Canara to Tinnevely. Vern. *Ur*. Gondapalasu ; *Kan*. Hessare.

15. *Alphonsea*, Hook. f. & Thoms.

Lofty or rarely small trees or occasionally erect or climbing shrubs. *Leaves* thick, coriaceous, glabrous and shining. *Flowers* small or middle-sized, in leaf-opposed rarely extra-axillary peduncled fascicles. Calyx with 3 small valvate *sepals* or cupular with 3 valvate teeth. *Petals* 6, valvate, in 2 whorls, larger than the sepals, equal, or the inner rather smaller. *Torus* cylindric or hemispheric. *Stamens* indefinite, loosely packed ; anthers dorsal, contiguous, not concealed by the apiculate connective. *Ovaries* 1 or more ; style oblong or depressed or stigma sessile ; ovules 4-8

in two series on the ventral suture. *Fruit* a ring of subsessile or stalked carpels.

Leaves glabrous:—

Petals .25 in. long; leaves obtuse:—

Leaves ovate; carpels smooth1. *madraspatana*.

Leaves lanceolate; carpels muricate2. *sclerocarpa*.

Petals .5 in. long; leaves caudate-acuminate3. *zeylanica*.

Leaves tomentose below; flowers .5 in. long, reddish green; carpels tomentose, yellow4. *lutea*.

1. ALPHONSEA MADRASPATANA, Bedd. Ic. t. 92, and Fl. t. 76; F. B. I. i. 89; King Ann. Calc. iv. 165, t. 214A.

Forests of the E. Gháts, in ravines and by streams in Vizagapatam, Cuddapah and N. Arcot, up to 3,000 ft.

2. ALPHONSEA SCLEROCARPA, Thw.; F. B. I. i. 89; King Ann. Calc. iv. 166, t. 215A.

Forests of the W. Gháts, in Nilgiris, Malabar, Anamalais, Pulneys and Tinnevely, up to 2,000 ft.

3. ALPHONSEA ZEYLANICA, Hook. f. & Thoms.; F. B. I. i. 89; Bedd. Ic. t. 90; King Ann. Calc. iv. 166, t. 214B.

Evergreen forests of Travancore and Tinnevely, at 2,000 to 3,000 ft.

4. ALPHONSEA LUTEA, Hook. f. & Thoms.; F. B. I. i. 89; Bedd. Ic. t. 91; King Ann. Calc. iv. 162, t. 209. *Uvaria lutea*, Roxb. Cor. Pl. i. t. 36.

Eastern slopes of Nilgiris below Coonoor, at 2,000 ft.

16. *Orophea*, Blume.

Small trees or shrubs. *Flowers* usually small, axillary, solitary, fascicled or cymose. *Sepals* 3, valvate. *Petals* 6, valvate, in 2 whorls; outer ovate; inner clawed, usually cohering by their margins into a mitriform cap, sometimes oblong and slightly approximate below the middle, the apices divergent, not vaulted, rarely without claws and very rarely slightly imbricate. *Stamens* definite, 6–12, ovoid, fleshy; anther-cells dorsal, large, contiguous, not concealed by the connective, which is sometimes prolonged into a conical apical point, not truncate. *Staminodes* 0 or 3–6. *Ovaries* 3–15; style short or 0; ovules 4. *Fruit* a ring of 1- or more-seeded, globular or oblong (rarely very long) carpels.

Outer petals, pedicels and young parts shaggy; carpels oblong, red.

1. *erythrocarpa*.

Outer petals and young parts pubescent or glabrous; carpels globose:—

Pedicels under .1 in. long, in nearly sessile clusters2. *Thomsoni*.

Pedicels more than .2 in. long:—

Buds and young shoots shortly tomentose; stamens 6...3. *zeylanica*.

Buds and young shoots glabrous; leaves 1.5–2.5 in. long, ovate; stamens 124. *uniflora*.

1. *OROPHEA ERYTHROCARPA*, Bedd. Ic. t. 68; F. B. I. i. 91; King Ann. Calc. iv. 103, t. 145A.

Forests of the W. Gháts in the Anamalais and Travancore, up to 2,000 ft.

2. *OROPHEA THOMSONI*, Bedd. Ic. t. 67; F. B. I. i. 91; King Ann. Calc. iv. 103, t. 144B.

Forests of the W. Gháts in the Anamalais and down to Tinnevely, up to 2,500 ft.

3. *OROPHEA ZEYLANICA*, Hook. f. & Thoms.; F. B. I. i. 90; Bedd. Ic. t. 70; King Ann. Calc. iv. 104, t. 146B.

Coorg and Mysore.

4. *OROPHEA UNIFLORA*, Hook. f. & Thoms.; F. B. I. i. 90; Bedd. Ic. t. 69; King Ann. Calc. iv. 102, t. 144A.

Forests of the W. Gháts from Coorg through Wynaad to Travancore and Tinnevely, up to 4,000 ft.

Family V. MENISPERMACEAE.

Climbing or twining shrubs or occasionally herbs, or very rarely erect shrubs or small trees. *Leaves* alternate, simple or very rarely compound, entire or lobed, usually palminerved, often peltate; stipules 0. *Flowers* dioecious, small, solitary, fascicled capitate or cymose or more frequently racemed or paniced, sometimes bracteate, occasionally 3-bracteolate. *Sepals* 6, in 2 whorls, or 9–12 in 3–4 whorls, rarely fewer than 6 and very rarely 5, outer often minute, occasionally all connate into a toothed or lobed cup. *Petals* never more than 6, rarely fewer, free or connate or 0. ♂ *Stamens* usually of the same number as, and opposite to, the petals; filaments free, with extrorse or vertically dehiscing anthers, or connate with anthers capitate or on the rim of a terminal disk; rudimentary carpels very small or 0. ♀ *Staminodes* 6 or 0; ovaries 3 or sometimes 1, rarely 6–12; styles simple or divided,

terminal but often becoming basilar by the curvature of the ovary; ovules solitary or very rarely 2, ventral, usually amphitropous. *Ripe carpels* drupaceous, with the style-scar sub-basal or sometimes terminal, sessile or stalked. *Seed* solitary, usually reniform or horseshoe-shaped; albumen copious or 0, even or ruminant; cotyledons linear or broad, appressed or spreading.

Key to Male Specimens.

Flowers sessile, in globose solitary or racemed heads; stamens, 3 free, 3 connate3. **Coscinium.**
 Flowers stalked, or, if sessile, in paniced or umbelled heads; stamens all free or all connate:—

Stamens connate, anthers in a terminal head or ring:—

Flowers in stalked solitary or umbellate heads; anthers on the rim of a stalked disk7. **Stephania.**

Flowers in panicles:—

Anthers in a globular head; petals 02. **Anamirta.**

Anthers in a ring; petals connate:—

Calyx campanulate.....9. **Cyclea.**

Calyx of 4 spreading sepals8. **Cissampelos.**

Stamens free:—

Leaves deeply cordate1. **Tinospora.**

Leaves acute, obtuse, or subcordate at base:—

Flowers 1 in. long; anthers oblong, opening down the sides

4. **Tiliacora.**

Flowers .05 in. long; anthers globose, opening across the top:—

Panicles up to 1 ft. long, drooping5. **Diplocclisia.**

Flowers in racemes, or short, erect panicles or axillary fascicles:—

Flowers in small fascicles or cymes6. **Cocculus.**

Flowers in slender racemes.....10. **Pachygone.**

Key to Female Specimens.

Style-scar terminal1. **Tinospora.**

Style-scar basal:—

Flowers sessile, in globose solitary or racemed heads ...3. **Coscinium.**

Flowers in a raceme of small cymes subtended by foliaceous cordate bracts; drupes hirsute8. **Cissampelos.**

Flowers in compound umbels or panicles:—

Ovary solitary:—

Flowers in panicles.....9. **Cyclea.**

Flowers in umbellate heads or in solitary condensed cymes

7. **Stephania**.

Ovaries 3-many :—

Drupes pedicelled on the receptacle :—

Leaf-blade rotund-cordate, acuminate, less than twice the petiole ; petals 02. **Anamirta**.

Leaf-blade oblong-ovate, acute, seldom cordate, more than 4 times the petiole ; petals 6, minute.....4. **Tiliacora**.

Drupes sessile on the receptacle :—

Drupes elongate, 1 in. long, panicles long, drooping

5. **Diploclisia**.

Drupes pisiform, under .3 in. :—

Flowers in short erect panicles or subsolitary ; albumen fleshy.....6. **Cocculus**.

Flowers racemose ; albumen 010. **Pachygone**.

1. **Tinospora**, Miers.

Climbing shrubs. Racemes or rarely panicles of usually precocious *flowers*, axillary terminal or from the old wood. *Sepals* 6, 2-seriate, inner larger. *Petals* 6, smaller. *♂ Stamens* 6, free ; anther-cells connivent at the thickened top of the filament, bursting longitudinally. *♀ Staminodes* 6, clavate ; ovaries 3 ; stigmas forked. *Drupes* ventrally flat, dorsally convex, round or oval ; style-scar subterminal ; endocarp rugose or tubercled, dorsally keeled, ventrally concave. *Seed* grooved ventrally or curved round a 2-lobed intrusion of the endocarp ; albumen ventrally ruminant ; cotyledons foliaceous, ovate, spreading.

TINOSPORA CORDIFOLIA, Miers ; F. B. I. i. 97. *Cocculus cordifolius*, DC. ; W. & A. 12 ; Wt. Ic. t. 485-6.

A climbing shrub with succulent stems, the bark papery at first then corky ; leaves glabrous ; flowers yellow, on nodes on the old wood ; drupes red, sessile ; endocarp with few isolated tubercles or smooth.

In forests and among trees in almost all Districts. Vern. *Hind.* Goluncha ; *Tel.* Tippa tiga ; *Tam.* Chintil.

2. **Anamirta**, Colebr.

Climbing shrubs. *Flowers* bibracteolate, paniced. *Sepals* 6. *Petals* 0. *♂ Anthers* capitate in many whorls on the top of the staminal column, 2-celled, bursting transversely. *♀ Staminodes*

9, clavate, in 1 whorl; ovaries 3, on a short gynophore; stigmas subcapitate, reflexed. *Drupe*s on a 3-fid gynophore, transversely or obliquely ovoid, somewhat compressed, dorsally gibbous; style-scar sub-basal; endocarp woody. *Seed* globose, embracing a sub-globose hollow intrusion of the endocarp; albumen dense, of horny granules; embryo curved; cotyledons narrow-oblong, thin, spreading.

ANAMIRTA COCCULUS, W. & A. 446; F. B. I. i. 98. *Cocculus suberosus*, W. & A. 11.

A large climbing shrub with long panicles of greenish flowers drooping from nodes of the old wood; leaves broadly ovate, cordate, firm, glabrous except for small tufts in the principal nerve axils.

Deccan, in Cuddapah and Mysore; W. Gháts in the Pulneys, Cochin and Travancore.

The source of the bitter drug "*Cocculus indicus*."

3. *Coscini*um, Colebr.

Climbing shrubs. *Flowers* bracteate, in dense globular solitary or racemose heads. *Sepals* 6, orbicular. *Petals* 3, large, spreading, elliptic. ♂ *Stamens* 6; outer 3 free, with 2-celled anthers; inner 3 connate, with 1-celled anthers; anthers bursting vertically. ♀ *Staminodes* 6; ovaries 3-6, subglobose; styles subulate, reflexed. *Drupe*s globose; endocarp bony. *Seed* globose, embracing a globose intrusion of the endocarp; albumen fleshy, ruminant ventrally; embryo straight; cotyledons orbicular, spreading, thin, sinuate lacinate or fenestrate.

COSCINIUM FENESTRATUM, Colebr.; F. B. I. i. 99.

Young shoots and under side of leaves hoary; leaves oblong-deltoid; flowers green, in heads .5-.8 in. across, borne on stalks 1 in. long; drupes 1-3, .5 in. in diam., subglobose, villous.

W. Gháts, in the Nilgiris and Travancore.

4. *Tiliacora*, Colebr.

Climbing shrubs. *Flowers* dioecious or polygamous, in axillary panicles. *Sepals* 6, 2-seriate, the outer much smaller. ♀ *Petals* 6, minute, cuneate. ♂ *Stamens* 6; anthers adnate, bursting vertically; rudimentary carpels 3. ♀ *Ovaries* 3-12; styles short, subulate. *Drupe*s obovoid, pedicelled, subcompressed; style-

scar sub-basal; endocarp thin, obscurely ribbed, grooved on both sides. *Seed* horseshoe-shaped; albumen oily, ruminant; cotyledons linear, fleshy, plano-convex, appressed.

TILIACORA ACUMINATA, Miers. *T. racemosa*, Colebr.; F. B. I. i. 99. *Cocculus acuminatus*, W. & A. 12.

A large evergreen climbing shrub; leaves ovate to lanceolate, obtuse or cordate at base, glabrous; flowers yellow, in racemes or narrow panicles; drupes oblong, red.

In all Districts, common in hedges and among bushes, but sometimes in forests, when it climbs to the tree-tops.

5. Diploclisia, Miers.

Characters of *Cocculus* but flowers in long drooping panicles from the old wood and centre of endocarp reduced to a thin flat septum.

DIPLOCLISIA GLAUDESCENS, Diels in Engl. Pflanzenr. Menisperm. 225, t. 77. *Cocculus macrocarpus*, W. & A. 13; F. B. I. i. 101; Wt. Ill. i. t. 7.

A large climber; leaves round or broader than long, 5-nerved, glaucous beneath, 2-4 in. across, shorter than their petioles; flowers yellow; drupes reddish, obovoid, 1 in. long.

Forests of the W. Ghâts in Malabar, Nilgiris, Pulneys and Travancore up to 6,000 ft.

6. Cocculus, DC.

Climbing or straggling or erect shrubs, or even trees. *Flowers* panicled or rarely fascicled in the axils of the leaves. *Sepals* 6, 2-seriate, outer smaller. *Petals* 6, smaller than the sepals, usually auricled at the base. σ *Stamens* embraced by the petals; anthers subglobose, cells bursting transversely. γ *Staminodes* 6 or 0; ovaries 3-6; styles usually cylindric. *Drupe* compressed; endocarp horseshoe-shaped, dorsally keeled and tubercled, sides concave, but not reduced to a thin flat septum. *Seed* curved; albumen fleshy; embryo annular; cotyledons linear, flat, appressed.

Erect shrub or small tree; leaves strongly 3-ribbed, caudate-acuminate; flowers pale yellow; peduncles glabrous1. *laurifolius*.

Climbing or straggling shrubs; leaves obtuse; peduncles densely pubescent:—

A woody climber; leaves narrowly elliptic, acute at base, subglabrous; ♂ flowers in axillary fascicles, ♀ subsolitary; sepals glabrous2. *pendulus*.

A bushy and scarcely woody climber; leaves ovate, obtuse at base, softly pubescent; flowers pale yellow, ♂ in short axillary panicles, ♀ 1–3, axillary; sepals pubescent; drupes purplish black

3. *hirsutus*.

1. *COCCULUS LAURIFOLIUS*, DC.; F. B. I. i. 101.

Coimbatore, at Geddesala (A. W. Lushington); W. Gháts in the Anamalais and Travancore Hills at 5,000 to 7,000 ft.

2. *COCCULUS PENDULUS*, Diels in Engl. Pflanzenr. Menisperm.

237. *C. Leaeba*, DC.; F. B. I. i. 102. *C. glabra*, W. & A. 13.

N. Circars in Ganjam; Deccan and Carnatic in Coimbatore, Madura and Tinnevely, in dry regions.

3. *COCCULUS HIRSUTUS*, Diels l.c. 236. *C. villosus*, DC.; F. B. I. i. 101; W. & A. 13.

In almost all Districts, straggling over bushes and small trees, chiefly in rather dry localities and often near villages.

7. *Stephania*, Lour.

Climbing shrubs. *Leaves* often peltate. Heads of *flowers* in axillary stalked umbels or, rarely, solitary or cymose. ♂ *Sepals* 6–10, free, ovate or obovate; petals 3–5, obovate, fleshy; anthers 6, on the rim of the flattened top of the staminal column, bursting transversely. ♀ *Sepals* 3–5; petals as in ♂; staminodes 0; ovary 1; style 3–6-partite. *Drupe* glabrous; endocarp compressed, horseshoe-shaped, dorsally tubercled, sides concave, perforated. *Seeds* almost annular; cotyledons long, slender, semi-terete, appressed.

Heads of flowers in stalked umbels1. *japonica*.

Male flowers in solitary axillary stalked heads; female flowers in condensed stalked cymes2. *Wightii*.

1. *STEPHANIA JAPONICA*, Miers. *S. hernandifolia*, Walp.; F. B. I. i. 103. *Clypea hernandifolia*, W. & A. 14; Wt. l.c. t. 939.

Forests of the W. Gháts, common from Coorg to Tinnevely, up to 6,000 ft.

2. STEPHANIA WIGHTII, Dunn. *S. rotunda*, Hook. f. & Thoms.; F. B. I. i. 103 not of Lour. *Clypea Wightii*, Arn. in Wt. III. i. 22.

Forests of the W. Gháts, in Malabar, Nilgiris and Tinnevely.

8. Cissampelos, Linn.

Suberect or climbing shrubs. *Leaves* often peltate. *Flowers*: ♂ cymose; sepals 4 (-5-6), erose; petals 4, connate, forming a 4-lobed cup; anthers 4, connate round the flattened top of the staminal column, bursting horizontally: ♀ racemed, crowded in the axils of leafy bracts; sepals 2 (or sepal and petal 1 each), 2-nerved, adnate to the bracts; staminodes 0; ovary 1, style short, 3-fid or 3-toothed. *Drupe* ovoid, style-scar sub-basal; endocarp horseshoe-shaped, compressed, dorsally tubercled, sides excavated. *Seed* curved; embryo slender; cotyledons narrow, semi-terete, appressed.

CISSAMPELOS PAREIRA, Linn.; F. B. I. i. 103. *C. convolvulacea*, Willd.; W. & A. 14.

A more or less tomentose climber with rotund usually cordate leaves, about equal in length to their petioles. Flowers greenish. Bracts of female racemes often densely imbricate. Cymes of male flowers 1-2 in. long, decompound. Drupes scarlet, hirsute.

In almost all Districts, very common.

9. Cyclea, Arn.

Climbing shrubs. *Leaves* usually peltate. *Flowers* in axillary panicles: ♂ Sepals 4-8, connate into a 4-5-lobed calyx; petals 4-8, more or less connate into a 4-5-lobed corolla; anthers 4-6, connate round the rim of the disk-like top of the staminal column, bursting horizontally: ♀ Calyx globose or campanulate, lobed; corolla globular; ovary 1, style short, 3-5-lobed, lobes radiating. *Drupe* ovoid; style-scar sub-basal; endocarp horseshoe-shaped, 2-locellate, dorsally tubercled, sides convex. *Seed* curved; cotyledons slender, semi-terete, appressed.

Calyx globose or broadly campanulate, lobes $\frac{1}{4}$ of tube; anther 6-8-celled.....1. *peltata*.

Calyx campanulate, lobes $\frac{1}{4}$ of tube; anthers 4-celled.....2. *Arnottii*.

Calyx campanulate, divided nearly to the base.....3. *fissicalyx*.

1. *CYCLEA PELTATA*, Diels (*not of* Hook. f. & Thoms.). *C. Burmanni*, Hook. f. & Thoms.; F. B. I. i. 104; Cooke Fl. Bomb. i. 23.

W. Gháts from S. Canara to Tinnevely, up to 3,000 ft.; Hills of Mysore and N. Arcot, up to 3,000 ft.

2. *CYCLEA ARNOTTII*, Miers. *C. peltata*, Hook. f. & Thoms.; F. B. I. i. 104 (*not Menispermum peltatum*, Lam.).

W. Gháts in S. Canara, Coorg, Wynaad, Nilgiris, Anamalais and Tinnevely Hills, up to 6,000 ft.

3. *CYCLEA FISSICALYX*, Dunn. *C. peltata*, Cooke Fl. Bomb. i. 24 (*not of* Hook f. & Thoms. *nor of* Diels).

Forests of Wynaad in Malabar.

10. *Pachygone*, Miers.

A climbing shrub. *Flowers* in axillary racemes. *Sepals* 6, in 2 whorls, outer smaller. *Petals* 6, much smaller, bases auricled and embracing the filaments. σ *Stamens* 6, filament incurved, anthers subglobose, didymous, bursting transversely; rudimentary carpels 3, minute. γ *Staminodes* 6; ovaries 3; styles stout, horizontal. *Drupe* reniform; style-scar sub-basal; endocarp reniform, rugulose. *Seed* horseshoe-shaped; albumen 0; cotyledons semi-terete, very thick, hard; radicle very short.

PACHYGONE OVATA, Miers; F. B. I. i. 105. *Cocculus Plukenetii*, DC.; W. & A. i. 14; Wt. Ic. t. 824, 825.

A large evergreen spreading shrub with long drooping or climbing branches and ovate blunt leaves. Flowers minute, white, honey-scented. *Drupe* 3 in. long.

Sandy sea-shores on the Coromandel Coast from Nellore to Tanjore and Tinnevely; Deccan in Bellary, Cuddapah and Mysore.

Family VI. BERBERIDACEAE.

Glabrous herbs or shrubs, sometimes climbing. *Leaves* 1-many-foliolate. *Stipules* petiolar or usually 0. *Flowers* hermaphrodite or rarely diclinous, regular, axillary, solitary or in simple or compound racemes, usually yellow or white, all members inserted on the receptacle. *Sepals* often petaloid, 3-9, in 1-3 whorls, imbricate or the outer rarely valvate. *Petals* equal in number to the sepals or twice as many, and, like them, caducous, nectariferous at the base or reduced to nectaries. *Stamens* (4-) 6 (-8)

opposite to the petals; filaments free or connate, sometimes irritable. *Anthers* bursting by two apical valves attached by their upper end or longitudinally. *Carpels* 1-3 (-9) distinct; stigma usually peltate; ovules many on a ventral suture, or few near the base, or covering the whole wall, usually anatropous. *Ripe carpels* berries or capsules, dehiscent or not.

Leaves simple1. **Berberis**.
Leaves pinnate2. **Mahonia**.

1. **Berberis**, Linn.

Erect shrubs with yellow wood. *Leaves* simple, fascicled in the axils of 3-5-partite or rarely simple spines. *Flowers* yellow, solitary fascicled racemose corymbose or paniced, with 2-3 small appressed bracteoles. *Sepals* 6, imbricate in 2 whorls. *Petals* 6, imbricate in 2 whorls, usually with 2 glands inside at the base. *Stamens* 6, free; anther-cells opening by recurved valves. *Ovary* simple; stigmas peltate, sessile or nearly so; ovules few, basal, erect. *Berries* few-seeded.

BERBERIS TINCTORIA, Lesch.; W. & A. 16.

An erect evergreen bush with pale brown shining twigs, prickly leaves, yellow flowers in panicles or corymbs, and glaucous spindle-shaped red berries with short stout styles.

Nilgiri and Pulney Hills of the W. Gháts, above 6,000 ft.; Shevaroy Hills of Salem.

2. **Mahonia**, Nutt.

Characters of BERBERIS but leaves pinnate with opposite leaflets, and stamens usually 2-toothed below the anther.

MAHONIA LESCHENAULTII, Takeda. *Berberis nepalensis*, var. *Leschenaultii*, Hook. f. & Thoms.; F. B. I. i. 109 *B. Leschenaultii*, Wall.; Wt. Ic. t. 940.

A shrub with stiff, erect, corky-barked stems; leaflets ovate-lanceolate, prickly; flowers yellow, in long erect racemes, fascicled among the upper leaves; berries globose, glaucous purple.

Hills of the W. Gháts from the Nilgiris southwards, above 5,000 ft., in Shola forest.

Family VII. NYMPHAEACEAE.

Aquatic perennial herbs. *Leaves* rising above, submerged in or usually floating on the water, often peltate, margins involute in bud. *Flowers* floating or rarely emergent, solitary on axillary peduncles. *Sepals* 3-5. *Petals* 3-5 or many. *Stamens* 6 or indefinite; all free and inserted on a fleshy torus surrounding or rarely enveloping the gynoecium. *Carpels* 3 or more, free or united or sunk in the pits of the torus; stigmas of the distinct carpels terminal and peltate, of many-carpelled ovaries as many as the carpels, adnate to the upper surface; ovules anatropous or orthotropous; few and pendent from the summit of the cell or many, covering the walls of the cells. *Fruit* of distinct indehiscent carpels or many-carpelled, fleshy or spongy. *Seeds* arilled or not; albumen floury, fleshy or rarely 0; embryo enclosed in the enlarged persistent embryo-sac.

Leaves floating; carpels connate into a many-celled ovary

1. *Nymphaea*.

Leaves raised above the water; carpels sunk in the torus

2. *Nelumbium*.1. *Nymphaea*, Linn.

Large perennial herbs. *Leaves* floating, usually peltate. *Flowers* large, floating, on long axillary peduncles. *Sepals* 4. *Petals* numerous, gradually passing into stamens. *Stamens* with petaloid filaments and small introrse anthers. *Carpels* sunk in the fleshy torus and with it forming a many-celled ovary crowned by the radiating stigmas; ovules very numerous, anatropous. *Fruit* a spongy many-seeded berry, ripening below the surface. *Seeds* minute, embedded in the pulp, enclosed in a sac-like aril.

Leaves entire or sinuate, glabrous on both sides; flowers blue, white, rose or purple1. *N. stellata*.

Leaves sharply sinuate-toothed, densely pubescent beneath; flowers white or red2. *N. pubescens*.

1. NYMPHAEA STELLATA, Willd.; F. B. I. i. 114; W. & A. 17; Wt. Ic. t. 178.

Tanks and ponds on the E. Coast from Madras to Tanjore, also in backwaters along the W. Coast.

2. *NYMPHAEA PUBESCENS*, Willd.; W. & A. 17. *N. Lotus*, Hook. f. & Thoms.; F. B. I. i. 114 (*not of* Linn.).

Ditches and tanks in most Districts both along the Coasts and on the Mysore plateau up to 3,000 ft.

2. *Nelumbium*, Juss.

A large erect herb, growing in shallow water from a stout creeping rootstock. *Leaves* when mature raised high above the water, peltate. *Flowers* rose white or yellow. *Sepals* 4-5. *Petals* and *stamens* numerous, all hypogynous and caducous; connective prolonged above the anther. *Ovaries* many, 1-celled, sunk in pits on the flat top of the broadly turbinate torus; style very short, exserted; stigma terminal, peltate; ovules 1-2, pendulous. *Carpels* ovoid, loose in the cavities; pericarp bony, smooth. *Seed* filling the carpel; testa spongy; albumen 0; cotyledons fleshy, thick, enclosing the folded plumule.

NELUMBium SPECIOSUM, Willd.; F. B. I. i. 116; W. & A. 16.

Peduncles and petioles 3-6 ft. high; leaves 2-3 ft. across, glaucous, concave; fruiting torus 3-4 in. across; ripe carpels rather larger than peas.

In tanks and ponds in most Districts, especially in the hotter localities.

The sacred Lotus. Vern. *Hind.* Kanwal; *Tam.* Tamaray.

Family VIII. *PAPAVERACEAE*.

Herbs with milky or coloured juice, rarely watery. *Leaves* radical or alternate. *Flowers* terminal, solitary cymose or paniculate. *Sepals* 2-3, hypogynous, free or cohering in a cap, caducous. *Petals* 4, in 2 whorls, large, crumpled, rarely more or 0. *Stamens* very numerous, in many series, very rarely few; filaments thread-like; anthers basifixed, bursting by lateral slits. *Ovary* 1-celled, with 2 to many parietal placentas or these being sometimes prolonged, divided into many nearly complete cells; style short or 0; stigmas radiating, as many as the placentas, free or adnate to and crowning the flat top of the ovary; ovules anatropous, parietal. *Fruit* a 1-celled or by the intrusion of the parietal placentas a many-celled capsule, opening longitudinally by 2 or 4 valves or by pores at the top of and between the placentas. *Seeds* usually numerous, with oily or fleshy albumen; embryo basal, minute,

Leaves and capsules quite glabrous; petals white pink or purple; stigmas adnate to the top of the capsule1. **Papaver**.
 Leaves and capsules spiny; petals yellow; stigmas radiating from the top of a short style2. **Argemone**.

1. **Papaver**, Linn.

Annual or perennial herbs with milky juice. *Leaves* variously lobed or cut. *Flowers* on long peduncles. *Ovary* 1-celled; stigmas adnate, radiating. *Capsule* short, opening by pores round the upper rim. *Seeds* small, pitted.

PAPAVER SOMNIFERUM, Linn.; F. B. I. i. 117; W. & A. 17.

An erect unbranched annual, with glabrous glaucous semi-amplexicaul leaves, ovate or linear-oblong and variously toothed; flowers white, red or purple; capsule globose, smooth, up to 1 in. thick.

Occasionally cultivated and found run wild. The Opium Poppy.

2. **Argemone**, Linn.

An erect, prickly annual with yellow juice. *Flowers* bright yellow. *Sepals* 2-3. *Petals* 4-6. *Stamens* very many. *Ovary* 1-celled; style very short; stigma 5-7-lobed; ovules many, on 4-7 parietal placentas. *Capsule* short, opening at the top by valves. *Seeds* many.

ARGEMONE MEXICANA, Linn.; F. B. I. i. 117; W. & A. 18.

A strong branched prickly annual, with sessile semi-amplexicaul sinuate-pinnatifid leaves variegated with white; flowers 1-3 in. across, yellow.

An introduced weed, found on roadsides, in waste places and fallow fields in all Districts.

Family IX. FUMARIACEAE.

Annual or perennial often glaucous herbs with watery juice. *Leaves* usually decom-pound. *Flowers* irregular, bisexual, racemed. *Sepals* 2, small, petaloid or scarious, deciduous. *Petals* 4, in 2 dissimilar pairs; 2 outer, both or only one gibbous at the base or spurred; inner smaller, often coherent at the tip. *Stamens* 6, usually in two bundles opposite the outer petals; central anther in each bundle 2-celled, others 1-celled. *Ovary* 1-celled; stigma on a distinct style, obtuse or lobed; ovules

parietal, 2 or more, amphitropous. *Fruit* an indehiscent 1-seeded nut, or a 2-valved many-seeded capsule. *Seeds* albuminous, with a minute embryo.

Fumaria, Linn.

Annual branched sarmentose herbs. *Leaves* finely divided. *Flowers* small, white or pink, with purple tips to the petals, in terminal or leaf-opposed racemes. Outer anterior *petal* flat, posterior gibbous at the base. *Stamens* diadelphous, the posterior bundle with a spur inside the base of the posterior petal. *Ovary* 1-celled; style filiform; ovules 2 on 2 placentas. *Fruit* indehiscent, globose, 1-seeded.

FUMARIA PARVIFLORA, Lam.; W. & A. 18.

A diffuse pale green herb; leaf-segments very narrow; flowers .15-.3 in. long; fruit slightly pointed even when ripe.

A weed of cultivation, chiefly at somewhat high elevations, as on the Mysore plateau and in the E. Nilgiris.

Family X. CRUCIFERAE.

Herbs, rarely a little woody at the base, with watery sometimes pungent juice. *Leaves* alternate or radical, exstipulate. *Flowers* usually racemed rarely solitary, terminal or axillary. *Sepals* 4, 2 often larger and saccate at the base, imbricate. *Petals* 4, hypogynous, imbricate. *Stamens* 6, rarely fewer or many, 4 inner longer, in opposite pairs. *Disk* with 4 glands opposite the sepals. *Ovary* 2-celled, the division formed by a membrane connecting the placentas, or 1-celled, or with many superposed cells; style short or 0; stigma entire or 2-lobed. *Ovules* many, 2-seriate on the 2 parietal placentas, or rarely 1 or 2 erect. *Fruit* either 2-celled, the 2 valves deciduous and leaving the seeds on the persistent dissepiment or indehiscent or transversely jointed. *Seeds* small; albumen 0; cotyledons plano-convex or longitudinally bent or folded; radicle turned over the back of the cotyledon (*incumbent*) or along its side (*accumbent*).

Pods linear and dehiscent:—

Pods dehiscing and bearing seeds throughout their whole length; sepals not pouched; cotyledons accumbent:—

Pods cylindric seeds globose, 2-seriate or irregularly 1-seriate

1. **Nasturtium.**

Pods flattened ; seeds compressed, 1-seriate ; flowers white

2. **Cardamine.**

Pods 4-sided ; seeds ovoid, 1-seriate ; flowers yellow**Barbarea.**

Pods with a seedless indehiscent beak ; sepals pouched at the base ; cotyledons incumbent :—

Beak of pod cylindric or conical ; seeds 1-seriate ; flowers yellow

Brassica.

Beak flattened ; seeds 2-seriate ; flowers lilac, or yellow with lilac veins**Eruca.**

Pods flat, short and broad, dehiscent :—

Pods with a rounded top ; style in a narrow cleft ; seeds 2...**Lepidium.**

Pods triangular ; style at the centre of the nearly flat top ; seeds many in each cell3. **Capsella.**

Pods of two globular indehiscent 1-seeded valves**Senebiera.**

1. **Nasturtium, Br.**

Terrestrial or aquatic branched glabrous or pubescent herbs. *Leaves* entire, lobed or pinnatifid. *Flowers* small, racemose, sometimes bracteate. *Sepals* spreading, not pouched at the base. *Petals* cuneate, hardly clawed, yellow or rarely white or 0. *Stamens* 2, 4 or 6. *Pod* long or short, nearly cylindric ; valves faintly 1-nerved ; septum thin, transparent. *Seeds* small, turgid, 2- or irregularly 1-seriate ; cotyledons accumbent.

Flowers white ; leaves all pinnate ; plant glabrous, aquatic...1. *officinale*.

Flowers yellow ; upper and middle leaves obovate, coarsely bluntly toothed.....2. *indicum*.

Flowers yellow ; all leaves bipinnatifid, teeth sharp...3. *madagascariense*.

1. **NASTURTIIUM OFFICINALE, Br. ; F. B. I. i. 133.**

Nilgiri Hills, probably introduced. The Watercress.

2. **NASTURTIIUM INDICUM, DC. ; F. B. I. i. 134. N. madagascariense, W. & A. 19 ; Wt. Ill. t. 13 (not of DC.).**

Wet places in hilly Districts, Mysore, Coorg, Nilgiris, Travancore.

3. **NASTURTIIUM MADAGASCARIENSE, DC. Syst. ii. 192.**

Hills of the N. Circars in Ganjam and Godavari, at low elevations.

2. **Cardamine, Linn.**

Herbs with entire lobed or pinnate *leaves*. *Flowers* white, pale purple or violet or very rarely yellow. *Sepals* not pouched. *Petals*

clawed. *Pods* narrow-linear, compressed, tapering at both ends; valves elastic, with a distinct midrib; stigma entire or 2-lobed. *Seeds* flattened, 1-seriate; cotyledons accumbent.

Lower leaves trifoliolate; pods 1·5 in. long.....1. *africana*.

Lower leaves 5- or more- foliolate; pods ·5–1 in. long:—

Petals 0; leaflets sinuate2. *trichocarpa*.

Petals 4; leaflets entire3. *hirsuta*.

1. CARDAMINE AFRICANA, Linn.; F. B. I. i. 137; W. & A. 20; Wt. Ic. t. 941.

W. Gháts from the Nilgiris to the Travancore Hills at 4,000 to 7,500 ft.; Sivagiri Hills in Tinnevely; in woods.

2. CARDAMINE TRICHOCARPA, Hochst. *C. subumbellata*, Hook.; F. B. I. i. 138. *C. borbonica*, Pers.; W. & A. 20.

W. Gháts, in the Nilgiris and Pulneys, above 6,000 ft.; hills of Mysore; in woods.

3. CARDAMINE HIRSUTA, Linn.; F. B. I. i. 138; W. & A. 20.

W. Gháts, in the Nilgiris and Pulneys, a weed, probably introduced.

3. *Capsella*, Moench.

Small branched herbs. Radical *leaves* in a rosette, entire or pinnatifid. *Sepals* spreading, not pouched at the base. *Pods* obcordate ovate-oblong or cuneate, laterally compressed; valves boat-shaped; septum very narrow; style short. *Seeds* many, in 2 rows, narrowly margined; cotyledons incumbent.

CAPSELLA BURSA-PASTORIS, Moench; F. B. I. i. 159.

A small herb with pinnatifid root leaves and auricled stem ones; pods obcordate.

A weed of cultivation, especially at higher elevations. The Shepherd's Purse.

The following species occur as escapes from cultivation, as casual weeds, or in cultivation only:—

BARBAREA PRAECOX, R. Br. "Winter Cress." Nilgiris.

BRASSICA CAMPESTRIS, Linn. Cultivated in various forms as the "Turnip," "Rape," "Kohl-Rabi," etc.

BRASSICA JUNCEA, Hook. f. & Thoms. Cultivated and found run wild, occasionally, as by Gough in the Kunbabs of the Nilgiris, in a locality to which it would hardly be considered introduced. The "Indian Mustard." Vern. *Hind.* Rai.

ERUCA SATIVA, Lam. "Rocket." Vern. *Hind.* Taranuri, Asan. Found only run wild in Madras, cultivated in N. India.

LEPIDIUM SATIVUM, Linn. "Garden Cress." Cultivated.

RAPHANUS SATIVUS, Linn. "Radish." Vern. *Hind.* Mūli. Cultivated.

SENEBIERA DIDYMA, Pers. "Lesser Wart-cress." Nilgiris.

Family XI. CAPPARIDACEAE.

Herbs or shrubs, erect or climbing, rarely trees. *Leaves* alternate or very rarely opposite, simple or palmately 3-9-foliolate; leaflets usually entire; stipules spinescent or minute or 0. *Flowers* solitary, racemed, corymbose or umbelled, regular or rarely a little irregular, bisexual or rarely dioecious. *Sepals* generally 4, free or connate, usually imbricate. *Petals* 4, rarely 0, or very rarely 2, imbricate, hypogynous or sometimes inserted on the disk. *Stamens* usually 6, sometimes 4 or numerous, hypogynous or perigynous or inserted at the base of or on a long or short gynophore. *Disk* 0 or annular or lining the tube of the calyx. *Ovary* usually stalked, 1-celled; stigma usually capitate, sessile; ovules many, amphi- or campylo-tropous, on 2-4 parietal placentas. *Fruit* a pod-like capsule or a berry or rarely a drupe. *Seeds* angular or reniform, often imbedded in pulp; albumen 0, or thin; embryo variously folded and curved.

Herbs with usually digitate leaves and capsular fruit:—

Ovary long-stalked, with 6 stamens inserted on the gynophore; leaves 5-foliolate1. **Gynandropsis.**

Ovary sessile, with 12 or more stamens inserted on the disk or, if the ovary is shortly stalked or stamens 6, then leaves 1-3-foliolate

2. **Cleome.**

Trees or shrubs with usually simple leaves and fruit usually a berry:—

Calyx tubular below:—

Petals 0; berry ovoid; leaves 3-5-foliolate; small trees

3. **Niebuhria.**

Petals 4; berry moniliform; leaves simple; climbers ...4. **Maerua.**

Calyx divided to the base into 4 sepals:—

Stamens inserted on the middle of the gynophore5. **Cadaba.**

Stamens inserted on the base of the gynophore:—

Leaves simple; thorny or unarmed small trees or erect or climbing shrubs6. **Capparis.**

Leaves trifoliolate; large unarmed trees7. **Crataeva.**

1. *Gynandropsis*, DC.

Annual leafy herbs. *Leaves* long-petioled, digitately 3-7-foliate. *Flowers* white or purple, in bracteate racemes. *Petals* 4, spreading, long-clawed, open in bud. *Stamens* about 6, inserted upon the long gynophore, spreading. *Ovary* stalked, 1-celled, with 2 many-ovuled parietal placentas. *Capsule* and *seeds* as in *Cleome*.

GYNANDROPSIS PENTAPHYLLA, DC. ; F. B. I. i. 171 ; W. & A. 21.

A tall pubescent plant with pale purplish flowers 3-6 in. across in glutinous corymbs which elongate into dense bracteate racemes. Capsules 2-4 in. long, nearly glabrous, striate.

An annual weed, common in waste places in all Districts in the plains and at low elevations.

2. *Cleome*, Linn.

Herbs. *Leaves* simple or digitately 3-9-foliate. *Flowers* racemose or solitary and axillary, yellow rose or purple. *Sepals* 4, spreading. *Petals* 4, ascending, imbricate in the bud. *Stamens* 6-20, inserted on the disk. *Ovary* sessile or shortly stalked ; style short or 0 ; ovules many on 2 parietal placentas. *Capsule* oblong or linear, valves 2, deciduous and leaving the seeds attached to the placentas. *Seeds* reniform.

Whole plant viscous with stalked glands ; ovary densely glandular, sessile ; capsule thinly glandular ; leaves 3-5-foliate ; flowers yellow

1. *viscosa*.

Plants glabrous, pubescent or asperous but not viscous ; ovary and capsule glabrous :—

Leaves simple, linear oblong ; stamens 6 ; flowers dull purple or pink

2. *monophylla*.

Leaves 3-9-foliate :—

Leaflets filiform ; capsule sessile ; stamens 6 ; flowers yellow ; plant glabrous 3. *tenella*.

Leaflets linear-oblong to obovate :—

Leaves 3-foliate :—

Stem and leaves glabrous, not asperous ; stamens 6 ; flowers purple 4. *Burmanni*.

Stem and leaves asperous ; capsule glabrous :—

Stem and leaves entirely clothed with stiff appressed scale-like hairs ; capsule 8 times as long as broad ; stamens about 30 ; flowers pink 5. *felina*.

Stem and leaves asperous with minute scattered prickles; stamens 6; flowers pink6. *aspera*.
 Leaves 5-9-foliolate; capsule 40 times as long as broad; stamens numerous; flowers rose7. *Chelidonii*.

1. CLEOME VISCOSA, Linn.; F. B. I. i. 170. *Polanisia icosandra*, W. & A. 22; Wt. Ic. t. 2.

A common weed, in fields and waste places, in all Districts.

2. CLEOME MONOPHYLLA, Linn.; F. B. I. i. 168; W. & A. 21.

A weed of fields and waste places, in all Districts.

3. CLEOME TENELLA, Linn. f.; F. B. I. i. 169; W. & A. 21.

Dry, usually sandy, places in the Carnatic Districts from Nellore to Tinnevely and S. Travancore.

4. CLEOME BURMANI, W. & A. 22; F. B. I. i. 170.

Fields and dry places in the Carnatic Districts.

5. CLEOME FELINA, Linn. f.; F. B. I. i. 170; W. & A. 22.

Deccan and Carnatic Districts, in dry places, often on black cotton soil.

6. CLEOME ASPERA, Koenig; F. B. I. i. 169; W. & A. 22; Wt. Ic. t. 287.

Sandy fields and waste places in the N. Circars, Deccan and Carnatic, up to 2,000 ft. in the hills.

7. CLEOME CHELIDONII, Linn. f.; F. B. I. i. 170. *Polanisia Chelidonii*, DC.; W. & A. 22; Wt. Ic. t. 319.

Moist places as on the borders of rice-fields, in the N. Circars and Deccan Districts.

3. Niebuhria, DC.

Small trees, unarmed. *Leaves* 3-5-foliolate; stipules setaceous. *Racemes* few-flowered, terminal or axillary. *Calyx-tube* ovoid; limb 4-cleft, lobes valvate. *Petals* 0. *Stamens* numerous, spreading from the gynophore at about the level of the top of the calyx-tube. *Ovary* stipitate, 1-celled; ovules many on 2 parietal placentas; stigma sessile. *Berry* ovoid, 1-seeded, on a long gynophore. *Seed* large with fleshy involute cotyledons.

- NIEBUHRIA APETALA, Dunn. *N. linearis*, DC.; F. B. I. i. 171; W. & A. 23; Wt. Ic. t. 174. *Capparis apetala*, Roth.

A small unarmed tree with axillary and terminal racemes of small dark greenish-purple flowers. Gynophore more than 1 in. long.

Dry forest tracts in Kistna, Kurnool and Cuddapah, also in Tinnevely.

The wood is divided by bark tissue into concentric sometimes anastomosing layers. Vern. *Tam. Iruvalli*.

4. *Maerua*, Forsk.

Climbing shrubs. *Leaves* simple. *Flowers* corymbose. *Calyx-tube* lined by the disk, with 4 valvate lobes. *Petals* 4, inserted on the edge of the disk, ovate, smaller than the calyx-lobes. *Stamens* many, inserted high up on the gynophore. *Ovary* long-stalked, 1-celled or becoming 2-celled by the cohesion of the placentas; ovules many, on 2-4 parietal placentas. *Berry* fleshy, elongate, moniliform, 1- or more-seeded. *Cotyledons* fleshy, involute.

MAERUA ARENARIA, Hook. f. & Thoms.; F. B. I. i. 171. *Niebuhr*ia oblongifolia, DC.; W. & A. 23.

A large woody climber with terminal corymbs of greenish-yellow flowers. Leaves simple and entire, varying from broadly ovate to oblong and from acute to retuse.

Deccan and Carnatic Districts from Godavari southwards. The wood is in concentric layers as in *Niebuhr*ia.

5. *Cadaba*, Forsk.

Rigid wiry unarmed shrubs. *Leaves* simple or 3-foliolate. *Flowers* solitary, corymbose or racemed. *Sepals* 4, unequal, in 2 whorls, outer 2 valvate. *Petals* 4 or 2, clawed, hypogynous. *Disk* large, coloured, encircling the gynophore with its tubular stalk and expanded trumpet-wise at the top or spathulate. *Stamens* 4-6, inserted unilaterally on the slender gynophore. *Ovary* 1-celled; stigma sessile; ovules many, on 2-4 parietal placentas. *Fruit* a fleshy slender cylindric berry or sometimes dehiscent ultimately by two valves which fall away from the placentas. *Seeds* globose; testa horny; cotyledons convolute.

Leaves trifoliate; petals 2, pure white with yellowish veins; disk limb bright yellow; stamens 6; fruit 2-4 in. long, dehiscent.....1. *trifoliata*.
Leaves simple; petals 4, greenish white; stamens 4; fruit 1-1.5 in. long, eventually dehiscent2. *indica*.

1. CADABA TRIFOLIATA, W. & A. 24; F. B. I. i. 172.

E. Ghát forests of Nellore, Cuddapah and Kurnool; also in Coimbatore, S. Arcot and Tinnevely.

A large shrub, the wood in concentric layers as in *Nie-
buhria*.

2. CADABA INDICA, Lam. ; F. B. I. i. 172 ; W. & A. 24.

Dry Districts of the N. Circars, Deccan and Carnatic from
Vizagapatam southwards ; often on old walls, on trees, in
waste places, and about villages.

A straggling or half-climbing shrub ; wood not in concentric
layers.

6. Capparis, Linn.

Trees or shrubs, erect straggling or climbing, unarmed or with
stipular thorns. *Leaves* simple or 0. *Flowers* white or coloured,
often showy. *Sepals* 4, free, in 2 whorls, all imbricate or the
outer valvate. *Petals* 4, sessile, imbricate, 2 rarely united into a
short spur at the base. *Stamens* long, numerous, inserted on the
torus at the base of the gynophore. *Ovary* stalked, 1-4-celled ;
ovules many, on 2-6 parietal placentas. *Fruit* fleshy, rarely
dehiscing by valves. *Seeds* numerous, imbedded in pulp ; testa
crustaceous or coriaceous ; cotyledons convolute.

Mature branches leafless ; thorns straight ; flowers under 1 in. across,
red ; fruit globose, red1. *aphylla*.

Mature branches leafy :—

Flowers solitary or nearly so :—

Ovary glabrous, grooved ; flowers 2·5-3 in. across :—

Thorns hooked ; leaves pubescent beneath ; flowers white ; fruit
slightly granular, oblong.....2. *grandiflora*.

Thorns straight ; leaves glabrous ; flowers red ; fruit rugose,
globular.....3. *stylosa*.

Ovary tomentose ; flowers white tinged with yellow :—

Flowers 1·5-2 in. across :—

Pedice! not less than $\frac{1}{2}$ the gynophore :—

Berry ovoid ; leaves 1·5-2·5 in. long4. *brevispina*.

Berry fusiform, narrowed into the gynophore ; leaves 3-5 in.
long5. *fusifera*.

Pedice! 5 times shorter than the gynophore ; berry ·7 in. across,
black6. *olacifolia*.

Flowers 4-5 in. across ; thorns minute or 0.....7. *Heyneana*.

Flowers in racemes, umbels, corymbs or panicles :—

Umbels or corymbs solitary :—

Pedice! stout, umbelled, 1-3-flowered, sessile at the ends of leafy
twigs ; fruit oblong8. *diversifolia*.

Pedicels approximate but not umbelled, often at the ends of leafless twigs, forming stout corymbs, or, if forming slender umbels, then thorns small or 0, and buds and pedicels finely tomentose :—

Leaves glabrous, oblong :—

Flowers 4–5 in. across ; thorns short, stout, hooked ; young branches glabrous9. *Moonii*.

Flowers 1·5 in. across ; thorns few or 0 ; young branches hoary :—

Flower-buds glabrous ; leaf nerves ascending

10. *Roxburghii*.

Flower-buds tomentose ; leaf nerves divaricate

11. *Cleghornii*.

Leaves usually velvety on both sides, never quite glabrous, lanceolate to oblate ; flowers 1 in. across ; fruit globose, dotted, 1·5 in. across12. *grandis*.

Pedicels slender, usually numerous, in terminal or axillary sessile or shortly-stalked umbels :—

Spines 0, or very few and small ; buds and pedicels glabrous :—

Twigs densely shortly pubescent ; fully grown buds ·2 in. long

13. *tomentella*.

Twigs glabrous ; fully grown buds ·1 in. long ; fruit pisiform

14. *parviflora*.

Spines numerous, recurved :—

Leaves round ; gynophore in flower 1 in. long ; umbel few-flowered15. *pedunculosa*.

Leaves ovate lanceolate ; gynophore in flower ·2 in. long ; umbel many-flowered ; flower small, white ; fruit ·5 in. across

16. *sepiaria*.

Umbels panicled ; flowers small, white ; prickles recurved or 0 ; fruit ·7 in. across, green17. *floribunda*.

Flowers in supra-axillary rows :—

Stout climbing shrub ; young parts tomentose ; fully grown buds ·3 in. in diam. ; fruit 1·5 in. in diam., reddish brown ; flowers white, turning rose18. *zeylanica*.

Slender shrub ; young parts glabrous ; fully grown buds ·15–2 in. in diam. ; flowers white ; fruit pisiform.....19. *tenera*.

1. *CAPPARIS APHYLLA*, Roth ; F. B. I. i. 174 ; W. & A. 27 ; Brand. For. Fl. t. 3.

Tinnevely.

A twiggy shrub or small tree ; wood light yellow, hard and close-grained.

2. *CAPPARIS GRANDIFLORA*, Wall. ; F. B. I. i. 174; *C. pyrifolia*, W. & A. 25; Wt. Ic. t. 1047 (*not of* Lam.).
E. slopes of Nilgiris, up to 4,000 ft., also adjacent parts of Mysore and Coimbatore.
A form with straight thorns and glabrose twigs was collected at Madras by Bulkley in 1703, also by Heyne in Mysore in 1800, but the specimens are imperfect.
3. *CAPPARIS STYLOSA*, DC. ; W. & A. 25. *C. divaricata*, Hook. f. & Thoms. ; F. B. I. i. 174; Wt. Ic. t. 889 (*not of* Lam.).
Dry forests of the Deccan and Carnatic from Kurnool to Tanjore, up to 1,500 ft., on stony land and on black cotton soil.
A small tree with rough bark and white hard wood. Vern. *Tel.* Badreni; *Tam.* Toaratti; *Mar.* Pachúnda.
4. *CAPPARIS BREVISPIA*, DC. ; W. & A. 24. *C. zeylanica*, Wall. ; F. B. I. i. 74 (*not of* Linn.).
Dry forest tracts of N. Circars, Nellore, Salem and Tinnevely, usually near the coast.
A handsome shrub with conspicuous flowers.
5. *CAPPARIS FUSIFERA*, Dunn in Kew Bull. 1914, 377.
Tinnevely District, at Udumanparai (Barber).
6. *CAPPARIS OLACIFOLIA*, Hook. f. & Thoms. ; F. B. I. i. 178.
Slopes of Mahendragiri Hill in Ganjam at 4,500 ft.
A thorny shrub.
7. *CAPPARIS HEYNEANA*, Wall. ; F. B. I. i. 74; W. & A. 25.
W. Gháts in Tinnevely District.
A nearly unarmed shrub.
8. *CAPPARIS DIVERSIFOLIA*, W. & A. 27; F. B. I. i. 175.
E. slopes of W. Gháts in Coimbatore and Tinnevely.
A shrub with zigzag branches and recurved thorns.
9. *CAPPARIS MOONII*, Wt. Ill. 35; F. B. I. i. 175.
W. Gháts from Coimbatore to Travancore and Tinnevely, up to 2,000 ft.
A large woody climber.
10. *CAPPARIS ROXBURGHII*, DC. ; F. B. I. i. 175; W. & A. 26; Wt. Ic. t. 1048.
Forests of the W. Gháts in Coimbatore; Chingleput in Carnatic.
A large woody climber.

11. CAPPARIS CLEGHORNII, Dunn. *C. Roxburghii*, Cooke Fl. Bomb. i. 46 (not DC.).
Forests of the W. Gháts in S. Canara and Mysore.
A large woody climber.
12. CAPPARIS GRANDIS, Linn. f.; F. B. I. i. 176; W. & A. 27. *C. bisperma*, Roxb.; W. & A. 26.
Hill forests of the Deccan, Carnatic and E. slopes of the W. Gháts from the Godavari through Kurnool and Bellary southwards.
A small tree with white durable wood. Vern. Tel. Guli, Ragota, Nallupi; Tam. Mudkondai; Kan. Torate.
13. CAPPARIS TOMENTELLA, Dunn. *C. parviflora*, Bedd. Ic. t. 276 (not of Hook. f. & Thoms.).
Forests of Travancore.
A large spreading much-branched shrub.
14. CAPPARIS PARVIFLORA, Hook. f. & Thoms.; F. B. I. i. 176.
Sivagiri Hills in Tinnevely on E. slopes of W. Gháts.
A spreading much-branched shrub.
15. CAPPARIS ROTUNDIFOLIA, Rottl. *C. pedunculosa*, Wall.; F. B. I. i. 176; W. & A. 27; Bedd. Ic. t. 277.
Striharikota forest in Nellore; Point Calimere in Tanjore, a coast plant.
A spreading shrub with small round leaves.
16. CAPPARIS SEPIARIA, Linn.; F. B. I. i. 177; W. & A. 26. *C. incanescens*, DC.; W. & A. 26.
N. Circars, Hyderabad, Deccan and Carnatic in dry forests and in hedges and scrub.
A large straggling shrub with wiry branches, very thorny.
17. CAPPARIS FLORIBUNDA, Wt. Ill. t. 14; F. B. I. i. 177.
N. Circars; Malabar.
A large woody climbing shrub.
18. CAPPARIS ZEYLANICA, Linn. *C. horrida*, Linn. f.; F. B. I. i. 178; W. & A. 26; Wt. Ic. t. 173.
Dry forests in all Districts of the N. Circars, Deccan and Carnatic, very common.
A large, climbing, very thorny shrub. Vern. Ur. Oserwa; Tel. Atonda; Mar. Wag, Gowindi; Tam. Atanday.
19. CAPPARIS TENERA, Dalz.; F. B. I. i. 179.
W. Gháts in Malabar.
A climbing shrub with hooked thorns.

7. Crataeva, Linn.

Small or medium-sized spreading trees. *Leaves* digitately trifoliolate. *Flowers* large, polygamous. *Sepals* 4, adnate to the lobed disk. *Petals* 4, long-clawed, open in bud. *Stamens* very numerous, inserted at the base of the gynophore. *Ovary* on a slender gynophore, 1-(2-)celled; stigma sessile; ovules many, on 2 parietal placentas. *Berry* fleshy with a hard rough rind; sometimes divided by a longitudinal septum. *Seeds* imbedded in the pulp.

CRATAEVA RELIGIOSA, Forst.; F. B. I. i. 172; Bedd. Fl. t. 116. *C. Roxburghii*, Br.; W. & A. 23. *C. Nurvala*, Ham.; W. & A. 23.

A small or medium-sized tree with broad terminal corymbs of white flowers, which turn yellow soon after opening; filaments purple. Berry 1-2 in. thick, globose or ovate.

Found here and there occasionally in almost all Districts, often planted, frequent along river banks.

Wood yellowish white, even-grained but not durable. Vern. *Tam.* Marvilanga; *Tel.* Uskia man, Voolemara; *Kan.* Nirvála; *Mal.* Nir mathalam.

Family XII. RESEDACEAE.

RESEDA LUTEOLA, L., has occurred as a casual weed about Ootacamund in the Nilgiris.

Family XIII. VIOLACEAE.

Herbs, shrubs or trees. *Leaves* alternate or very rarely opposite, entire crenate serrate or pinnatisect, stipulate. *Flowers* regular or irregular. *Sepals* 5, equal or unequal, imbricate or contorted in bud. *Stamens* 5, free or monadelphous; anthers erect, connective produced beyond the cells. *Ovary* sessile, 1-celled; style simple; stigma terminal or lateral, capitate, truncate or cupular, entire or lobed; ovules many, on 3 parietal placentas, anatropous. *Fruit* a 3-valved capsule, rarely a berry. *Seeds* small; albumen fleshy; embryo axile; cotyledons flat.

Herbs, sometimes a little woody at the base; flowers irregular:—

Petals about equal in height; sepals produced below their insertion; peduncles more than 1 in. long1. *Viola*.

Petals unequal, lower larger, oval or orbicular, on a long claw; sepals not produced below; peduncles less than .5 in. long2. **Ionidium**. Shrubs or trees with regular flowers3. **Alsodeia**.

1. *Viola*.

Herbs, rarely woody below. *Flowers* 1-2 on long axillary peduncles, sometimes large-petalled but ripening few seeds, sometimes small-petalled ripening many seeds, normal and cleistogamous. *Sepals* produced at the base. *Petals* erect or spreading, lower largest, spurred at the base. *Anthers* connate, connectives of the lower 2 often produced into spurs within the spur of the corolla. *Style* clavate or truncate, tip straight or bent; stigma obtuse, lobed or cup-shaped. *Capsule* 3-valved. *Seeds* ovoid or globose.

Leaves triangular-lanceolate, not deeply cordate; petiole winged; plant stemless1. *Patrinii*.
Leaves ovate, deeply cordate; petiole not winged; flowers on leafy stems:—

Sepals linear, gradually attenuate from a lanceolate base; stigma usually lateral.....2. *serpens*.
Sepals ovate-lanceolate, obtuse; stigma terminal.....3. *distans*.

1. *VIOLA PATRINII*, DC.; F. B. I. i. 183; W. & A. 32. *V. Walkeri*, Wt. Ill. i. 42, t. 18.

Hills of the N. Circars in Ganjam at 4,000 ft.; W. Gháts in Mysore, the Nilgiris, Anamalais and Pulneys at over 4,000 ft.; Shevaroy Hills in Salem.

2. *VIOLA SERPENS*, Wall.; W. & A. 32; F. B. I. i. 184. *V. Wightiana*, Wt. Ic. t. 943.

Hills of Ganjam; W. Gháts from the Nilgiris to Travancore at over 6,000 ft.

3. *VIOLA DISTANS*, Wall.; F. B. I. i. 183.

W. Gháts, in Mysore the Nilgiris and Pulneys at over 6,000 ft.

2. *Ionidium*, Vent.

Herbs or small shrubs. *Leaves* alternate, rarely opposite. *Flowers* solitary, axillary, red. *Sepals* 5, subequal, not produced below their insertion. *Petals* 5, the lower one on a long claw, saccate or spurred at the base. *Anthers* connate or free, 2 or 4 of

them gibbous or spurred at the back. *Ovary* ovoid ; style clavate, incurved ; stigma oblique. *Capsule* 3-valved, subglobose, few-seeded. *Seeds* globose ; testa crustaceous.

Seeds conspicuously finely striate ; valves of capsule about .2 in. long ; undershrub, with red flowers1. *suffruticosum*.
Seeds obscurely striate ; capsule valves about .4 in. long ; large shrub, with pink flowers2. *travancoricum*.

1. *IONIDIUM SUFFRUTICOSUM*, Ging. ; F. B. I. i. 185 ; W. & A. 32 ; Wt. Ill. t. 19 ; Wt. Ic. t. 308. *I. enneaspermum*, DC. ; W. & A. 33. *I. leptorhizum*, DC. ; W. & A. 33.

Grassy places, in fields, roadsides, and open forest lands in almost all Districts.

2. *IONIDIUM TRAVANCORICUM*, Bedd. Ic. t. 230.

Hills of Tinnevely and Travancore at 2,000 to 3,000 ft.

3. *Alsodeia*.

Trees or shrubs. *Leaves* alternate or rarely opposite ; transverse nervules numerous, distinct and parallel ; stipules rigid. *Flowers* small, axillary or terminal, solitary fascicled cymose or racemose, regular ; peduncles with many bracts. *Sepals* 5, rigid. *Petals* 5, sessile. *Stamens* 5, on or within the annular disk ; connective produced into a membranous appendage. *Ovary* ovoid ; style straight ; stigma terminal ; ovules few or many. *Capsule* 3-valved, few-seeded. *Seeds* glabrous.

ALSOIDEIA ZEYLANICA, Thwaites ; F. B. I. i. 187.

A large shrub or small tree with ovate-lanceolate slightly crenate or serrate leaves and fascicles of small white flowers on short axillary spurs.

Forests of Malabar and Travancore up to 2,500 ft.

Family XIV. BIXACEAE.

Trees or shrubs. *Leaves* alternate ; stipules small or 0. *Inflorescence* various. *Flowers* regular, 1-2-sexual. *Sepals* 3-8, usually imbricate and free or connate and bursting irregularly, usually deciduous. *Petals* 4-5 or 0, imbricate or contorted in bud, deciduous. *Stamens* indefinite, usually hypogynous ; anthers dehiscing by slits or pores. *Disk* thickened, often glandular. *Ovary* 1-, or, by the intrusion of walls, multi-cellular ; style and

stigmas free or united. *Ovules* on 2 or many parietal placentas, amphitropous or anatropous. *Fruit* dry or fleshy, indehiscent or dehiscent with as many valves as placentas. *Seeds* arillate or testa pulpy; albumen fleshy; embryo axile; cotyledons foliaceous, often cordate.

Leaves palmately lobed; flowers 4–5 in. across; fruit a capsule

1. *Cochlospermum*.

Leaves not lobed:—

Leaves large, ovate-cordate; petals white or pink, 1 in. long; fruit a bristly capsule; seeds covered by a red testa2. *Bixa*.

Leaves large, more or less oblong; petals white or yellowish, .5 in. long with scales attached within; fruit large, woody, tomentose:—

Stamens 5–8; peduncles 1–few-flowered, axillary; leaves serrate or with reticulate nervules3. *Hydnocarpus*.

Stamens indefinite; peduncles often fascicled on the old wood; leaves entire with parallel nervules4. *Asteriastigma*.

Leaves rather small; petals 0, or under .1 in. long; fruit a small glabrous berry; usually thorny:—

Style long, erect, entire or lobed; all the flowers bisexual

5. *Scolopia*.

Style very short, entire or branched; most flowers unisexual:—

Stigma entire or slightly lobed at the end of the simple style; ovary 1-celled; berry globose, passing abruptly into the style, under .3 in. in diam.....6. *Xylosma*.

Stigmas separate at the top of the style or of its branches or, if capitate, then berry ovate, acuminate, over .5 in. in diam.

7. *Flacourtia*.

1. *Cochlospermum*, Kunth.

Trees or shrubs with yellow or red juice. *Leaves* palmately lobed. *Flowers* bisexual. *Sepals* 5, deciduous. *Petals* 5, large, contorted in bud. *Stamens* many, inserted on an eglandular disk; anthers opening by a short slit at the top. *Ovary* nearly 3–5-celled; ovules numerous, on 3–5 parietal placentas; style 1, filiform. *Capsule* 3–5-valved. *Seeds* numerous, cochleate; testa with long woolly hairs; albumen oily; embryo curved.

COCHLOSPERMUM GOSSYPIMUM, DC.; F. B. I. i. 190; W. & A. 87; Bedd. Fl. t. 171.

A deciduous tree with 5-lobed leaves tomentose beneath, and large golden-yellow flowers with silky sepals. Fruit a

large brown pear-shaped striate leathery capsule, containing numerous seeds surrounded by pale brown cottony hairs.

Dry forests, especially on stony hills, in all Districts, but less common on the W. Coast, conspicuous when in flower in the hot season before the leaves appear.

Wood fibrous, quite valueless; cotton of the seeds but little used. Vern. *Hind.* Galgal; *Ur.* Kontopalas; *Tel.* Kandugogu; *Tam.* Tanaku, Kongillam; *Mal.* Appa kudakka; *Kan.* Baruga.

2. *Bixa*, Linn.

A shrub or small tree. *Leaves* simple; stipules minute. *Flowers* in terminal panicles, bisexual. *Sepals* 5, imbricate, deciduous. *Petals* 5, contorted in bud. *Anthers* opening by 2 terminal pores. *Ovary* 1-celled; style slender, curved; ovules numerous, on 2 parietal placentas. *Capsule* loculicidally 2-valved. *Seeds* many, testa red and pulpy; albumen fleshy; embryo large; cotyledons flat.

BIXA ORELLANA, Linn.; F. B. I. i. 190; W. & A. 31; Wt. Ill. i. 17; Bedd. Fl. t. 79.

A small evergreen tree with large cordate-acuminate leaves. Flowers large, white or purplish, few together in terminal panicles. Capsules reddish brown, softly bristly.

Cultivated and found run wild especially in Western Districts. The Arnotto. Vern. *Hind.* Latkan; *Tel.* Jafra.

3. *Hydnocarpus*, Gaertn.

Shrubs or trees. *Leaves* alternate, entire or serrate; transverse nervules and reticulation conspicuous. *Flowers* solitary, fascicled, racemose or cymose, dioecious. *Sepals* 5, imbricate. *Petals* 5, provided at the base inside with a scale often as long as themselves. ♂ *Stamens* 5-15; anthers reniform or ovate-cordate with a broad connective. *Ovary* rudimentary or 0. ♀ *Stamens* similar but without pollen, or rudimentary. *Ovary* 1-celled; stigmas 3-6, sessile or nearly so, spreading, dilated, lobed; ovules many, on 3-6 parietal placentas. *Berry* globose, many-seeded; rind hard. *Seeds* 1, 2 or few, imbedded in pulp; testa bony; albumen oily; cotyledons broad, flat.

Leaves more or less serrate, nervules parallel; petals glabrous, greenish white; scale as long as petals, linear, ciliate1. *Wightiana*.

Leaves entire, nervules reticulate; petals ciliate, greenish; scale $\frac{1}{2}$ as long as petals, ovate, woolly2. *alpina*.

1. *HYDNOCARPUS WIGHTIANA*, Bl.; F. B. I. i. 196. *H. inebrians*, Vahl; Wt. Ill. i. t. 16.

Forests of the W. Coast and W. Gháts from S. Canara southwards, up to 2,000 ft., often near water.

A large evergreen tree: wood greyish white, of no value. Vern. *Mar.* Kastel; *Tam.* Maravetti; *Kan.* Toratti; *Mal.* Kodi, Nirvetti.

2. *HYDNOCARPUS ALPINA*, Wt. Ic. t. 942; F. B. I. i. 197; Bedd. Fl. t. 77.

W. Gháts in hill forests from S. Canara to Travancore, at up to 6,000 ft.

A large evergreen tree; wood greyish brown, of no great value. Vern. *Tam.* Attuchankalai.

4. *Asteriastigma*, Bedd.

Large trees with alternate entire leaves. *Flowers* large, polygamous, in axillary fascicles or on the old wood. *Sepals* 4, imbricate. *Petals* 12-16, shorter than the sepals, ciliate, furnished with 3-lobed scales at the base inside. *Stamens* very numerous, many-seriate. *Ovary* with many ovules on 6-7 parietal placentas, and as many large sessile 2-lobed stigmas. *Fruit* woody, globose, with numerous angular seeds.

ASTERIASTIGMA MACROCARPA, Bedd. Fl. t. 266; Bedd. Ic. t. 242.

A handsome evergreen tree. *Flowers* 1 in. across, white, with a sickly scent. *Fruit* dark brown, 5-6 in. in diam.

Forests of Travancore at 1,500 to 3,000 ft.

5. *Scolopia*, Schreber.

Spinous trees; spines often branched. *Leaves* alternate, with 3 or 5 pairs of nerves spreading from the base; stipules minute or 0. *Flowers* small, 2-sexual, in axillary racemes or narrow panicles. *Sepals* and *petals* 4-6 each, imbricate in bud. *Stamens* many; anthers ovoid, opening by slits, connective produced above. *Ovary* 1-celled; style erect; stigma entire or lobed; ovules few, on 3-4 parietal placentas. *Berry* 2-6-seeded.

SCOLOPIA CRENATA, Clos.; F. B. I. i. 191; Bedd. Fl. t. 78.

Phoberos crenatus, *lanceolatus* and *Wightianus*, W. & A. 29-30.

A medium-sized tree, very variable in armature and leaves. Stamens spreading over a circle $\cdot 3\text{--}\cdot 4$ in. across, much exceeding the small white petals, shorter than the long straight style. Berry green, globose, $\cdot 7$ in. in diam.

Forests of the W. Gháts in all hill Districts above 2,000 ft.; higher hills of Cuddapah, Chingleput and Salem.

Wood reddish brown, said to be very hard. Vern. *Tam. Charalu*.

6. *Xylosma*, Forster.

Characters of *FLACOURTIA*, but with rarely more than 2 placentas in each 1-celled ovary, and with the style usually entire, short, and ending in a few sessile stigmas. *Berry* globose, 3-8-seeded.

Leaves linear-lanceolate or linear-oblong, acuminate1. *longifolium*.
Leaves ovate, obtuse or acute2. *latifolium*.

1. *XYLOSMA LONGIFOLIUM*, Clos.; F. B. I. i. 194; Brand. For. Fl. t. 4.

Forests of the E. Gháts in Ganjam and Vizagapatam at 2,000 to 4,500 ft.

A small tree, unarmed or with few very long straight spines.

2. *XYLOSMA LATIFOLIUM*, Hook f. and Thoms.; F. B. I. i. 194.

Forests of the Bababuden Hills in Mysore.

A large thorny tree.

7. *Flacourtia*, Commers.

Trees or shrubs, often thorny. *Leaves* toothed or crenate, 3-5-nerved at the base. *Flowers* small, dioecious, rarely 2-sexual. *Sepals* 4-5, imbricate. *Petals* 0. *Stamens* many; anthers versatile. *Ovary* on an annulate or lobed disk, or disk represented by separate glands; styles 2-10, separate, connate or 0; stigmas notched, 2-lobed or, in the absence of styles, capitate; ovules usually in pairs on each placenta. *Fruit* indehiscent; endocarp hard with as many cells as seeds, or separating into 1-seeded stones; cotyledons orbicular.

A shrub. Leaves 1-2 in. long, obovate; flowers usually on the thorns; pedicels nearly or quite glabrous1. *sepiaria*.

A shrub or small tree. Leaves 2-4 in. long, ovate, usually glabrous; flowers not on the thorns :—

Racemes glabrous; fruits ovoid, .6-.7 in. long2. *Cataphracta*.

Racemes pubescent or tomentose; fruits purple, the size of peas

3. *Ramontchi*.

A thorny tree. Leaves 5-7 in. long, pubescent beneath; fruits resembling cherries4. *montana*.

1. *FLACOURTIA SEPIARIA*, Roxb. Cor. Pl. i. 48, t. 68; F. B. I. i. 194; W. & A. 29.

Scrub forests in all Districts, especially on the Coromandel coast and in the Deccan.

2. *FLACOURTIA CATAPHRACTA*, Roxb.; F. B. I. i. 193.

E. Gháts of Vizagapatam District (Lushington).

A small tree, only once reported, but it occurs in Orissa, so may well be occasional in the N. Circars.

3. *FLACOURTIA RAMONTCHI*, L'Hérit.; F. B. I. i. 193; W. & A. 29; Wt. Ic. t. 85. *F. sapida*, Roxb. Cor. Pl. i. t. 69; W. & A. 29.

Forests of the N. Circars and Deccan, up to 3,000 ft.; occasional on the W. Coast.

A shrub with small leaves in the scrub forests and on rocky hills, a small tree with rather large leaves in the larger forests. Vern. *Ur*. Balibaincho; *Tel*. Kanregu; *Tam*. Katukali.

4. *FLACOURTIA MONTANA*, Grah.; F. B. I. i. 192.

Forests of the W. Coast and W. Gháts, not common, up to 3,000 ft.

Family XV. PITTOSPORACEAE.

Trees, erect or climbing shrubs or undershrubs. *Leaves* alternate, fascicled, very rarely opposite or verticillate, quite entire or very rarely toothed. *Flowers* hermaphrodite, in various terminal and axillary inflorescences. *Sepals* 5, free or connate, imbricate. *Petals* 5, hypogynous, free or connate, imbricate. *Torus* small. *Stamens* 5, free; anthers versatile. *Ovary* 1-celled, or 2-5-celled by the intrusion of as many parietal placentas; style simple; stigma terminal, 2-5-lobed; ovules many, parietal or axile, anatropous. *Fruit* capsular or indehiscent. *Seeds* usually

numerous; albumen copious; embryo minute, radicle next the hilum.

Pittosporum, Banks.

Trees or erect shrubs, usually green. *Sepals* free or connate below. *Petals* erect, recurved at the top, claws connivent or connate. *Stamens* 5, erect; anthers 2-celled, bursting inwards by slits. *Ovary* sessile or shortly stalked, incompletely 2-3-celled; ovules 2 or more on each placenta. *Capsule* 1-celled, woody, 2- or 3-valved; placentas in the middle of the valves. *Seeds* 2-9, covered with oily resinous pulp.

Flowers in paniculate often contracted racemes; fruit .2 in. in diam.; seeds 6; twigs glabrous.....1. *floribundum*.
Flowers in slender simple racemes; fruit .35-.4 in. in diam.; seeds 5-9; twigs glabrous2. *nilghirens*.
Flowers in stout sessile or subsessile umbels; fruit .4 in. in diam.; seeds 3-4; twigs glabrous or pubescent.....3. *tetraspermum*.
Flowers in umbellate racemes; fruit .4 in. in diam.; seeds 6; ovary inflorescence and twigs densely tomentose4. *dasycaulon*.

1. **PITTOSPORUM FLORIBUNDUM**, W. & A. 154; F. B. I. i. 199.

Mahendragiri Hill in Ganjam at 4,500 ft.; Hills of S. Arcot and Salem; W. Gháts from Mysore southwards, at 4,000 ft. and higher.

2. **PITTOSPORUM NILGHIRENSE**, W. & A. 154; F. B. I. i. 198; Wt. Ill. i. t. 70.

W. Gháts, in Shola forests above 3,000 ft., from Mysore to Travancore.

3. **PITTOSPORUM TETRASPERMUM**, W. & A. 154; Wt. Ic. t. 971; F. B. I. i. 198.

W. Gháts, in Shola forests above 5,000 ft. from Nilgiris to Travancore; Hills of Coimbatore.

4. **PITTOSPORUM DASYCAULON**, Miq.; F. B. I. i. 199.

W. Gháts, in Shola forests above 3,000 ft., from Mysore to Travancore.

Family XVI. POLYGALACEAE.

Annual or perennial herbs, erect or climbing shrubs, or large trees. *Leaves* usually alternate, simple, entire or occasionally

reduced to scales or 0. *Stipules* 0. *Flowers* irregular, 2-sexual, bracteate racemose capitate paniced or spicate. *Sepals* 5, unequal, the 2 inner (*wing-sepals*) larger, petaloid, deciduous or persistent, imbricate in bud. *Petals* 3 or 5, unequal, free from each other but usually adherent to the staminal sheath, the lower one usually boat-shaped. *Stamens* usually 8, monadelphous or rarely distinct; anthers 1- or 2-celled opening by transverse valves or terminal pores. *Ovary* free, 1-3-celled; style simple, generally curved, filiform or variously dilated above; stigma capitate; ovules 1 or more in each cell, anatropous. *Fruit* generally a 2-celled 2-seeded loculicidal capsule, or indehiscent and 1-seeded or of 3 indehiscent samaroid carpels. *Seeds* pendulous, usually carunculate; testa often hairy; embryo axile, with or without fleshy albumen.

Herbs or shrubs; capsule loculicidal, 2-celled, 2-seeded; flowers irregular:—

Annual herbs. Flowers minute, in long terminal spikes; stamens 4-5; sepals nearly equal1. **Salomonina**.

Herbs or shrubs. Flowers fairly large, stalked; stamens 8; 2 sepals larger (*wing-sepals*)2. **Polygala**.

Large trees; fruit indehiscent; 1-seeded; flowers nearly regular

3. **Xanthophyllum**.

1. *Salomonina*, Lour.

Small branched or simple annuals. *Flowers* minute, in dense terminal spikes. *Sepals* nearly equal. *Petals* 3, united at the base with the staminal tube, the inferior one keel-shaped, hooded, not crested. *Stamens* 4-5, filaments united into a sheath below; anthers opening by pores. *Ovary* 2-celled; 1 pendulous ovule in each cell. *Capsule* laterally compressed, 2-celled, loculicidal; margins toothed. *Seeds* albuminous; strophiole small or 0.

SALOMONIA OBLONGIFOLIA, DC.; F. B. I. i. 207. *S. obovata*, Wt. Ill. i. t. 22B.

A small, slender, simple or much-branched herb with angular stems, small elliptic or ovate-lanceolate leaves and long thin spikes of minute pink flowers, followed by didymous fruit with setose-dentate margins.

W. Coast, from S. Canara southwards; W. Gháts, in Mysore at 2,000 to 3,000 ft., not common,

2. *Polygala*, Linn.

Herbs or rarely shrubs. *Leaves* alternate. *Sepals* usually persistent, the 2 inner larger, sometimes petaloid. *Petals* 3, united below with the staminal sheath, the lower boat-shaped and usually crested at the tip. *Stamens* 8; filaments united below into a split sheath; anthers opening by pores. *Ovary* 2-celled; ovules 1 in each cell, pendulous. *Capsule* 2-celled and -seeded, loculicidal. *Seeds* with a waxy 3-fid or cup-shaped and 3-toothed caruncle, often expanded above into 1-3 short or long narrow membranous wings or into broad appendages covering the seed; albumen rarely absent.

Caruncle appendages nearly or quite covering the seed; large or small shrubs:—

Flowers yellow, in drooping terminal racemes; capsule fleshy, glabrous; leaves lanceolate, 4-6 in. long1. *arillata*.

Flowers pink, in erect axillary racemes; capsule pubescent; leaves obovate, under 1.5 in. long.....2. *javana*.

Caruncle appendages narrow or absent; herbs, sometimes a little woody at the base:—

Caruncle cup-shaped, truncate or with 3 distant teeth:—

Bracts caducous; caruncle with 3 long linear appendages; capsule broadly winged; flowers blue3. *sibirica*.

Bracts persistent; appendages of caruncle short or 0:—

Linear leaves, short few-flowered racemes and small green flowers, erect; often annual4. *rosmarinifolia*.

Leaves and flowers spreading or drooping:—

Stems, racemes, and capsules with stiff white spreading bulbous-based hairs; flowers greenish or pinkish; outer sepals narrow, caudate-acuminate.....5. *bolbothrix*.

White bulbous-based hairs absent:—

Racemes under 1 in. long, dense; flowers yellow

6. *chinensis*.

Racemes 2 or more in. long, peduncled; flowers yellow; outer sepals ovate, rounded at the top7. *elongata*.

Caruncle 3-fid to the base, sinuses very narrow, curved:—

Capsule winged; wing-petals obovate, membranous:—

Racemes long, tail-like, terminal; bracts caducous; wings narrow, few-veined8. *leptalea*.

Racemes mostly lateral; bracts persistent; flower rose-coloured; wings large, broad, petaloid9. *persicariaefolia*.

Capsule wingless; wing-petals falcate, herbaceous:—

Racemes less than 1 in. long:—

Capsule downy throughout; flowers yellow, .17–.25 in. long; wing-petals densely pubescent, triangular; bracts persistent; leaves thin10. *erioptera*.

Capsule glabrous; flowers .1 in. long, greenish; wing-petals subglabrous, oblique; bracts caducous; leaves fleshy

11. *telephioides*.

Racemes over 2 in. long12. *Wightiana*.

1. *POLYGALA ARILLATA*, Ham.; F. B. I. i. 200; W. & A. 39.
W. Ghâts, in forests throughout the Range above 4,000 ft.
A large graceful shrub, reaching 12 ft. in height.
2. *POLYGALA JAVANA*, DC.; F. B. I. i. 201; W. & A. 38.
Hills of the Deccan in Cuddapah, Coimbatore, S. Arcot and Madura; W. Ghâts from Malabar to Tinnevely; up to 5,000 ft.
A branching undershrub.
3. *POLYGALA SIBIRICA*, Linn.; F. B. I. i. 205. *P. Heyneana*, W. & A. 38 (*not of Wall.*).
W. Ghâts from the Nilgiris to Tinnevely, chiefly above 6,000 ft.
4. *POLYGALA ROSMARINIFOLIA*, W. & A. 37; F. B. I. i. 204.
N. Circars, Hills of Vizagapatam; W. Ghâts from Coimbatore to Tinnevely; Hills of Salem.
5. *POLYGALA BOLBOTHRIX*, Dunn. *P. ciliata*, W. & A. 38 (*not of Linn.*).
W. Ghâts, from Coimbatore to Tinnevely.
6. *POLYGALA CHINENSIS*, Linn.; F. B. I. i. 204. *P. arvensis*, Willd.; W. & A. 36. *P. Rothiana*, W. & A. 37. *P. tranquebarica*, Mart.; W. & A. 37.
In all dry Districts from the plains to 3,000 ft.; scarce or absent from the W. Coast.
7. *POLYGALA ELONGATA*, Klein; F. B. I. i. 203; W. & A. 38.
Dry Districts of the Deccan and Carnatic from Bellary southwards.
8. *POLYGALA LEPTALEA*, DC.; F. B. I. i. 202.
N. Circars, in Ganjam; Nilgiris and Hills of Coimbatore.
9. *POLYGALA PERSICARIAEFOLIA*, DJ.; F. B. I. 202. *P. Wallichiana*, Wt. Ill. i. t. 22A.
Hills of Mysore and Coimbatore above 4,000 ft.;

W. Gháts from Nilgiris to Travancore, about 4,000 to 5,000 ft.

10. *POLYGALA ERIOPTERA*, DC.; F. B. I. i. 203. *P. Vahliana*, DC.; W. & A. 36. *P. triflora*, W. & A. 37 (Linn. ?).

Dry parts of the N. Circars in Vizagapatam and Godavari; dry Deccan and Carnatic Districts from the Kistna river southwards.

11. *POLYGALA TELEPHIODES*, Willd.; F. B. I. i. 205; W. & A. 36. Carnatic, in Nellore and Chingleput; Travancore.

12. *POLYGALA WIGHTIANA*, Wall.; W. & A. 38.

W. Carnatic, in Coimbatore and Madura.

3. *Xanthophyllum*, Roxb.

Large trees. *Leaves* large coriaceous, often yellowish green. *Sepals* subequal, 5. *Petals* 4-5, nearly equal, the lower one keeled, not crested. *Stamens* 8, 2 hypogynous, the remainder adnate to the base of the petals. *Ovary* 1-celled, stipitate; ovules 4-16, various in insertion and direction. *Fruit* 1-celled, indehiscent, 1-seeded. *Seeds* exalbuminous, estrophiolate.

XANTHOPHYLLUM FLAVESCENS, Roxb. Cor. Pl. iii. t. 248; F. B. I. i. 209; W. & A. 39.

A large timber tree with stout oblong-lanceolate leaves and finely tomentose terminal panicles of white or yellowish flowers, followed by globular thick-walled rugose green fruits .5-.8 in. in diam.

W. Gháts from the Nilgiris southwards, up to 4,000 ft.

Wood yellowish, hard and close-grained. Vern. *Tam.* Mattei; *Mal.* Madakka.

Family XVII. CARYOPHYLLACEAE.

Herbs, sometimes a little woody at the base. *Leaves* opposite, usually quite entire; stipules scarious, setaceous or 0. *Flowers* bisexual or rarely unisexual. *Sepals* 4-5, free and imbricate in bud or united into a toothed calyx. *Petals* 4-5, entire toothed or bifid, sessile or clawed or sometimes 0. *Stamens* 8-10, rarely fewer, inserted with the petals and sometimes slightly adherent to them; anthers 2-celled, cells parallel, dehiscing lengthwise. *Disk* annular or glandular or elongated into a gynophore. *Ovary* free, 1-celled or imperfectly 3-5-celled; styles 2-5, free or connate, stigmatose on the inner side; ovules 2 or many on a free central

or a basal placenta. *Fruit* a dry capsule, dehiscing by teeth or valves equal to or double in number to the styles or rarely indehiscent or irregularly dehiscent. *Seeds* few or many, rarely solitary; albumen mealy or rarely fleshy; embryo usually curved round the albumen; cotyledons frequently incumbent.

Calyx gamosepalous, 4-5-lobed; petals long-clawed; styles distinct; leaves ovate:—

Styles 2; leaves clasping the stem; pedicels long and slender

1. **Saponaria.**

Styles 3; leaves narrowed below; pedicels very short 2. **Silene.**
Sepals free; petals subsessile or 0:—

Stipules 0; styles free; capsule 3-10-toothed; leaves ovate or oblong (except *Sagina*):—

Leaves ovate or oblong:—

Capsule long, often curved, with 6-10 short teeth; petals shortly notched or 0; pubescence scattered 3. **Cerastium.**

Capsule short, straight, splitting to below the middle into 3-5 blunt lobes; petals split to the base or entire or 0; pubescence in a line on the stems:—

Petals split to the base or 0 4. **Stellaria.**

Petals entire 5. **Arenaria.**

Leaves linear; petals entire, minute or 0; capsule 4-5-valved to the base 6. **Sagina.**

Stipules setaceous or scarious; styles 3, united below (except *Spergula*); capsule 3-valved; leaves linear-subulate to obovate:—

Stipules small, scarious; petals entire; styles distinct; leaves linear-subulate 7. **Spergula.**

Stipules setaceous or linear, forming an interpetiolar fringe; petals 2-6-fid; styles 3-fid; leaves ovate 8. **Drymaria.**

Stipules and bracts conspicuous, shining, scarious; petals entire or toothed; styles united; leaves linear-lanceolate or spathulate:—

Sepals keeled; style 3-fid 9. **Polycarpon.**

Sepals terete; style 3-toothed 10. **Polycarpacea.**

1. **Saponaria, Linn.**

Annuals. *Leaves* flat. *Flowers* in dichotomous cymes. *Calyx* tubular or inflated, 5-toothed; obscurely nerved. *Petals* 5, clawed; limb obovoid. *Stamens* 10. *Disk* produced into a very short gynophore. *Ovary* 1-celled or imperfectly 2-3-celled; styles 2-3; ovules many. *Capsule* broadly ovoid, 4-toothed. *Seeds* globose, hilum marginal; embryo annular,

SAPONARIA VACCARIA, Linn.; F. B. I. i. 217. *Gypsophila Vaccaria*, Sm.; W. & A. 42.

An erect glabrous annual with rose-coloured erose petals and stem-clasping leaves.

A weed of cultivation, occasional only.

2. *Silene*, Linn.

Herbs. *Flowers* solitary or cymose, frequently secund. *Calyx* tubular campanulate or inflated, 10- rarely many-nerved. *Petals* 5, with narrow claws; limb entire bifid or laciniate, usually with 2 basal scales. *Stamens* 10. *Disk* usually produced into a long gynophore. *Ovary* incompletely 3-celled or rarely 1-celled; styles 3 or rarely 5; ovules many. *Capsule* 3-6-toothed or -valved. *Seeds* reniform, usually tubercled; embryo annular.

SILENE GALLICA, Willd.; F. B. I. i. 218.

A simple or branched, erect, hairy annual; flowers in long secund racemes, the lower ones shortly pedicelled; petals small, white.

An introduced weed, Coimbatore, Madura and Nilgiris.

3. *Cerastium*, Linn.

Herbs, usually pubescent. *Leaves* usually small. *Flowers* white, in terminal dichotomous cymes. *Sepals* 5 or rarely 4. *Petals* as many, notched or 2-fid, rarely entire, sometimes 0. *Stamens* 10, rarely fewer. *Ovary* 1-celled; styles 3-5; ovules many. *Capsule* cylindric, often curved near the top, dehiscing by short teeth, double in number to the styles. *Seeds* compressed, with an annular embryo.

Leaves lanceolate, acute, over 1 in. long; flowers shorter than the pedicels, which are uniformly pubescent; tips of the capsule-teeth revolute1. *indicum*.

Leaves small, ovate, obtuse; flowers longer than their pedicels; capsule-teeth straight with revolute margins2. *glomeratum*.

CERASTIUM INDICUM, Wight & Arn. 43; F. B. I. i. 227; Wt. Ill. i. t. 26.

Nilgiri, Anamalai and Pulney Hills, above 6,000 ft.

CERASTIUM GLOMERATUM, Thuill. *C. vulgatum*, W. & A. 43; Wt. Ic. t. 948. *C. vulgatum*, Linn. (partly); F. B. I. i. 228.

W. Gháts, from S. Canara and Mysore southwards, above 6,000 ft.

4. *Stellaria*, Linn.

Herbs. *Flowers* in dichotomous cymes or rarely solitary and terminal, white. *Petals* 5 or rarely 4, 2-fid or 2-partite or 0. *Stamens* 10, rarely 8. *Disk* annular or glandular. *Ovary* 1- rarely 3-celled; styles 3, rarely 2-5; ovules usually numerous. *Capsule* short, splitting to below the middle into entire or bifid valves equalling in number the styles. *Seeds* compressed, tubercled, granular or smooth; embryo annular.

Plants with simple hairs:—

Leaves 1-2 in. long, petiole .1-2 in. long; flowers in long-stalked paniculate cymes; seed solitary, wrinkled1. *paniculata*.

Leaves under 1 in. long, lower petioles as long as the leaves; flowers mostly solitary, axillary; seeds numerous, tubercled

2. *media*.

Plants with stellate tomentum3. *saxatilis*.

1. *STELLARIA PANICULATA*, Edgew.; F. B. I. i. 229. *S. media*, W. & A. 42 (not of Linn.)

W. Gháts, in Nilgiris at 8,000 ft.

2. *STELLARIA MEDIA*, Linn.; F. B. I. i. 230; Wt. Ic. t. 947.

W. Gháts, in the Nilgiris, Anamalais and Pulneys; Shevaroy's in Salem District; usually above 7,000 ft. Chickweed.

3. *STELLARIA SAXATILIS*, Ham.; F. B. I. i. 232.

About Ootacamund in Nilgiris, 7,000 to 8,000 ft.

5. *Arenaria*, Linn.

Herbs. *Flowers* white or pink, solitary or in dichotomous cymes. *Sepals* 5. *Petals* 5, entire lacerate or retuse never 2-fid or 2-partite, sometimes 0. *Stamens* 10, rarely 5. *Disk* lobed or annular. *Ovary* 1-celled; styles (2-)3-4; ovules usually many. *Capsule* rarely longer than the sepals, 2-6-valved. *Seeds* smooth or tubercled.

ARENARIA NEELGERRENSIS, Wight & Arn. 43; F. B. I. i. 239; Wt. Ic. t. 949.

A small procumbent herb with long rather stiff branches terminating in paniculate bracteate racemes of small flowers with entire white petals; leaves ovate, apiculate, .2-.5 in. long.

Nilgiris, above 6,000 ft.

Arenaria serpyllifolia, Linn., was formerly found near Madras.

6. *Sagina*, Linn.

Small herbs. *Leaves* linear-subulate, connate at the base, exstipulate. *Flowers* small, globose, solitary, axillary and terminal, pedicelled. *Sepals* 4-5. *Petals* 4-5, entire or 0. *Stamens* 4-10, perigynous. *Ovary* 1-celled; styles 4-5; ovules numerous. *Capsule* 4-5-valved to the base. *Seeds* reniform.

SAGINA PROCUMBENS, Linn.; F. B. I. i. 242.

A small annual with many branches from near the base, short linear acute leaves and small globose flowers on long slender cymose pedicels.

Nilgiri Hills, above 6,000 ft.

7. *Spergula*, Linn.

Herbs with forked or fascicled branches. *Leaves* often apparently whorled; stipules small scarious. *Flowers* in peduncled paniculate cymes. *Sepals* 5. *Petals* 4, entire. *Stamens* 5 or 10, rarely fewer. *Ovary* 1-celled; styles 3-5, ovules many. *Capsule* with 3-5 entire valves. *Seeds* margined or winged.

SPERGULA ARVENSIS, Linn.; F. B. I. i. 243.

A loosely-branched annual weed with whorl-like clusters of narrow linear leaves and large irregular terminal cymes of long-stalked flowers. Seeds brown or black, papillose.

A weed of cool climate cultivation, Nilgiri and Pulney Hills above 6,000 ft.

8. *Drymaria*, Willd.

Diffuse glabrous herbs. *Leaves* roundish; stipules of several bristles. *Flowers* in axillary and terminal cymes. *Sepals* 5. *Petals* 5, 2-6-fid. *Stamens* 3-5. *Ovary* 1-celled; style 3-fid; ovules 3 or more. *Capsule* 3-valved to the base. *Seeds* orbicular, muricate.

DRYMARIA CORDATA, Willd.; F. B. I. i. 244; W. & A. 359.

A diffuse glabrous herb with nearly orbicular 3-5-nerved leaves and slender inflorescence.

W. Gháts, from S. Canara and Mysore southwards, up to 4,000 ft., in shady places.

9. Polycarpon, Linn.

Diffuse or erect and dichotomously branched herbs. *Leaves* opposite or from the presence of axillary fascicles appearing whorled; stipules scarious. *Flowers* crowded, with many scarious bracts. *Sepals* 5, keeled. *Petals* 5, small, hyaline, entire or notched. *Stamens* 3-5. *Ovary* 1-celled; style short, 3-fid. *Seeds* many, ovoid; embryo nearly straight.

Perennial with all the flowers subsessile1. *Loeflingiae*.

Annual with the older flowers shorter than their pedicels

2. *tetraphyllum*.

1. POLYCARPON LOEFLINGIAE, Benth. & Hook. f.; F. B. I. i. 245.

Hapalosia Loeflingiae, Wall.; W. & A. 358.

Fields and waste places in various Districts.

2. POLYCARPON TETRAPHYLLUM, Linn.; Hook. f. Stud. Fl. B.

Isles 63.

Nilgiri Hills, an introduced weed.

10. Polycarpaea, Linn.

Herbs, usually erect. *Leaves* subulate, linear or spatulate; stipules scarious. *Flowers* numerous, in lax or contracted cymes. *Sepals* 5, often coloured, scarious throughout or, rarely, at the margins only. *Petals* 5, entire toothed or erose. *Stamens* 5, free or coherent with the petals. *Ovary* 1-celled; style slender, 3-fid or 3-toothed; ovules numerous. *Capsule* 3-valved. *Seeds* obovoid or compressed. *Embryo* curved, rarely straight.

Leaves spatulate, in rosettes at the root and at the internodes; flowers spicate at the ends of subumbellate branches1. *spicata*.

Leaves subulate, not forming rosettes; flowers in irregular cymes:—

Plant shortly tomentose; cymes dense or lax:—

Erect annual or subperennial herb of sandy places; leaves flat with leaf-fascicles in the axils; stipules much fimbriate, .15 in. long; internodes with scattered hairs; sepals white, .1-2 in. long

2. *corymbosa*.

Much-branched shrub of rock crevices; leaves with inrolled margins; leaves in axils few or 0; stipules hardly fimbriate, .05 in. long; internodes densely white-tomentose; sepals coloured, .1 in. long3. *aurea*.

Plant glabrous; cymes lax; stipules .03 in. long4. *diffusa*.

1. POLYCARPAEA SPICATA, W. & A.; F. B. I. i. 246; Wt. Ic. t. 510.

Tuticorin in Tinnevely.

2. POLYCARPAEA CORYMBOSA, Lam.; F. B. I. i. 245; Wt. Ic. t. 712; W. & A. 358. *P. spadicea*, Lam.; W. & A. 357.

Fields, waste places and sandy river banks in most dry Districts, especially in the Deccan and Carnatic; more scarce on the W. Coast.

3. POLYCARPAEA AUREA, W. & A. *P. corymbosa*, var. *aurea*, Wt. Ill. ii. 44, t. 110; F. B. I. i. 245.

Rocky places in the Deccan Hills, Guntur, Kurnool, Bellary, Cuddapah, N. Arcot, Chingleput, at 2,000 to 4,000 ft.

4. POLYCARPAEA DIFFUSA, W. & A.; F. B. I. i. 245; Wt. Ill. ii. 44.

Near Tuticorin in Tinnevely.

Family XVIII. PORTULACACEAE.

Herbs or shrubs, usually succulent and glabrous. *Leaves* entire; stipules scarious or setose. *Flowers* regular, hermaphrodite. *Sepals* 2, imbricate. *Petals* 4-5, free or connate at the base, imbricate, fugacious. *Stamens* 4 or indefinite; filaments slender; anthers 2-celled. *Ovary* 1-celled, free or half-inferior; style 2-8-fid; ovules 2 or many, from the base of the ovary or from a central column. *Capsule* dehiscent in 2-8 valves or circumsciss, rarely indehiscent. *Seeds* 1 or more, usually with a curved embryo surrounding a mealy albumen.

Diffuse herbs, with small terminal solitary or clustered yellow flowers surrounded by a whorl of leaves; ovary half-adnate ...1. **Portulaca**. Erect shrubby plants, with terminal panicles of moderate-sized purple flowers; ovary free.....2. **Talinum**.

1. Portulaca, Linn.

Herbs, usually succulent. *Leaves* with scaly or hairy stipules. *Flowers* terminal, surrounded by a whorl of leaves. *Sepals* joined below, free part deciduous. *Petals* 4-6. *Ovary* half-inferior; style 3-8-fid; ovules numerous. *Capsule* circumsciss, crustaceous. *Seeds* many, reniform.

Nodes without scales or hairs; leaves cuneate-oblong to linear, .3-1.5 in. long; flowers clustered1. *oleracea*.
 Nodes surrounded by lanceolate scales; leaves ovate-lanceolate; flowers solitary2. *Wightiana*.
 Nodes clothed with few or abundant hairs:—

Leaves lanceolate to ovate; flowers solitary, half sunk in the enlarged end of the pedicel and surrounded by 4 involucreal leaves

3. *quadrifida*.

Leaves terete or linear; flowers clustered; abundant brown hairs round the flowers and, usually, at the nodes:—

Stems many, diffuse from the top of a fusiform fleshy root; leaves linear, margined; hairs plentiful and conspicuous.....4. *tuberosa*.

Stem erect from a stout branched annual root; leaves terete; hairs short and inconspicuous5. *suffruticosa*.

1. *PORTULACA OLERACEA*, Linn.; F. B. I. i. 246; W. & A. 356.

In all dry Districts, a prostrate succulent herb.

2. *PORTULACA WIGHTIANA*, Wall.; F. B. I. i. 247; W. & A. 356.

Dry Districts of the Deccan and Carnatic from the Godavari southwards, usually on rocks and up to 2,500 ft.

3. *PORTULACA QUADRIFIDA*, Linn.; F. B. I. i. 247; Wt. Ill. ii. t. 109.

Roadsides and waste places in most Districts.

4. *PORTULACA TUBEROSA*, Roxb.; F. B. I. i. 247.

Dry Districts of the S. Carnatic from S. Arcot to Travancore.

5. *PORTULACA SUFFRUTICOSA*, Wight; F. B. I. i. 247; W. & A. 356.

Carnatic Districts from Coimbatore and S. Arcot to Travancore, up to 3,500 ft.

2. *Talinum*, Adans.

Succulent shrubs. *Leaves* flat, exstipulate. *Flowers* paniced. *Petals* 4-5, hypogynous. *Stamens* numerous. *Ovary* superior; style 3-fid; ovules many. *Capsule* globose, 3-valved. *Seeds* radiate-striate, strophiolate.

TALINUM CUNEIFOLIUM, Willd.; F. B. I. i. 247. *T. indicum*, W. & A. 356.

A small shrubby plant with obovate-cuneiform leaves, purple flowers and pea-like fruit.

Carnatic at "Chimmanackmoor" (Chinnanayakanur?) (W. & A.).

Family XIX. TAMARISCACEAE.

Mostly bushes or small trees. *Leaves* minute, scale-like, rarely sheathing, sometimes fleshy, stipules 0. *Flowers* usually spicate or in crowded racemes, small, regular. *Sepals* and *petals* 5 each or rarely 4, sometimes a little connate below. *Stamens* 5-10 or many, free or connate below. *Disk* 10-glandular. *Ovary* free, 1-celled or imperfectly 2-5-celled; styles 2-5, free or connate; ovules 2-many on each of the 2-5 basal placentas. *Capsule* 3-valved. *Seeds* erect, plumed with a crest of long hairs or winged; albumen floury or 0; embryo straight.

Tamarix, Linn.

Leaves amplexicaul or sheathing. *Flowers* in lateral or terminal spikes or close racemes, white or pink. *Stamens* 4-10; anthers apiculate. *Ovary* narrowed upwards; styles 3-4, short, dilated into stigmas above. *Seeds* with a sessile plume, exalbuminous; embryo ovoid.

Young twigs covered by the minute imbricating leaf-blades, which ultimately spread showing their amplexicaul but not sheathing bases; flowers .08 in. long, in long narrow paniced racemes; capsule valves .12 in. long; stamens 51. *gallica*.

Young twigs covered by the short cylindric leaf-sheaths:—

Flowers .08 in. long, in narrow terminal spikes; capsule valves .15 in. long; stamens 52. *dioica*.

Flowers .2 in. long in a long terminal raceme; valves of capsule .4 in. long; stamens 103. *ericoides*.

1. TAMARIX GALLICA, Linn.; F. B. I. i. 248; W. & A. 40; Brand. For. Fl. t. 5.

Sandy river-beds in the Deccan and on the E. Coast, Godavari, Anantapur.

A gregarious shrub or small tree. Bark rough; wood reddish with broad medullary rays, a good fuel. Vern. Hind. Jhau; Tel. Palivi; Tam. Kiri.

2. TAMARIX DIOICA, Roxb.; F. B. I. i. 249; W. & A. 40; Brand. For. Fl. t. 6. *T. gallica*, Wt. Ill. i. t. 24A (not of Linn.).

Sandy river-beds and on the sea-coast, apparently very scarce.

A gregarious shrub or small tree, used for fuel.

3. *TAMARIX ERICOIDES*, Rottl.; F. B. I. i. 249. *Trichaurus ericoides*, W. & A. 40; Wt. Ill. i. t. 24B; Wt. Ic. t. 22.

Beds of rivers in the Circars, Deccan and Carnatic, usually inland and often in forest regions.

A beautiful shrub, not gregarious, often associated with other river-bed shrubs like *Rhabdia* and *Homonoya riparia*.

Family XX. ELATINACEAE.

Small aquatic or terrestrial herbs or small shrubs. *Leaves* opposite or whorled, stipulate. *Flowers* small, axillary, regular, hermaphrodite. *Sepals* and *petals* 2-5, free, imbricate. *Stamens* as many as the petals or twice as many. *Ovary* 2-5-celled; styles 2-5. *Ovules* numerous, axile. *Capsule* septicidal; valves separating from the axis and septa. *Seeds* straight or curved, often rugose; albumen 0 or scanty; embryo cylindric; cotyledons small.

Leaves entire; sepals 3; small aquatic herbs with solitary axillary flowers1. **Elatine**.
Leaves serrate or crenate; sepals 5; stout erect terrestrial plants, with solitary or more or less densely clustered flowers2. **Bergia**.

1. *Elatine*, Linn.

Small aquatic creeping herbs. *Leaves* opposite or whorled. *Flowers* minute, usually one at each node. *Sepals* 2-4, membranous, obtuse. *Petals* 2-4. *Ovary* globose. *Capsule* membranous; valves separating from the septa. *Seeds* curved, ridged and pitted.

Flowers subsessile; stamens exceeding the sepals1. *americana*.
Flowers shorter than their pedicels; stamens shorter than the sepals
 2. *ambigua*.

1. *ELATINE AMERICANA*, Arn.; F. B. I. i. 250.

Prostrate in patches on mud, Nilgiris.

2. *ELATINE AMBIGUA*, Wight; W. & A. 41; Wt. Ill. i. t. 25B; F. B. I. i. 251.

Prostrate in patches on mud, Madras.

2. *Bergia*, Linn.

Terrestrial or aquatic herbs, annuals or undershrubs. *Leaves* opposite, usually serrate. *Flowers* axillary, solitary or fascicled,

minute. *Sepals* acute, with membranous margins. *Capsule* 3-5-celled.

Succulent aquatics; leaves 1-1.5 in. long, crenate; flowers crowded, pink; stamens 101. *capensis*.

Stiff erect terrestrial plants; leaves .3-.8(-1.5) in. long, serrate:—

Flowers 1-4 together, pink; stamens 10.....2. *aestivosa*.

Flowers red, in dense clusters; stamens 3-53. *ammannioides*.

1. *BERGIA CAPENSIS*, Linn. *B. verticillata*, Willd.; F. B. I. i. 252. *B. aquatica*, Roxb. Cor. Pl. ii. 22, t. 142. *Elatine verticillata*, W. & A. 41.

Carnatic, from Chingieput to Trichinopoly.

A glabrous succulent herb of rice-fields and the margins of tanks.

2. *BERGIA AESTIVOSA*, W. & A. 41; F. B. I. i. 251. *Elatine aestivosa*, Wt. Ic. t. 222.

Carnatic, about Madras.

3. *BERGIA AMMANNIODES*, Roxb.; F. B. I. i. 251; Wt. Ill. i. 25A. *Elatine ammannioides*, W. & A. 41.

Marshy places in most Districts.

Family XXI. HYPERICACEAE.

Shrubs or herbs, rarely trees. *Leaves* opposite or, rarely, alternate, often marked with transparent or black dots, exstipulate. *Flowers* solitary or cymose, terminal or, rarely, axillary, yellow red or white. *Sepals* and *petals* (4-) 5 each; petals contorted in bud. *Stamens* indefinite, free or variously combined into 3 or 5 bunches or rarely all connate. *Ovary* 3-5-carpelled, 1- or 3-5-celled; styles free or connate; ovules few or many on axile or parietal placentas, or rarely solitary basal. *Fruit* a septicidal or rarely loculicidal capsule or an indehiscent berry. *Seeds* exarillate, exalbuminous.

Shrubs with yellow flowers 2-3 in. across, or herbs; capsule septicidal; seeds wingless1. **Hypericum**.

Shrubs with pink flowers, .5 in. across; capsule loculicidal; seeds winged2. **Cratoxylon**.

1. *Hypericum*, Linn.

Herbs, shrubs or small trees. *Leaves* usually sessile. *Flowers* cymose, yellow, usually terminal. *Sepals* 5. *Petals* 5, usually

somewhat oblique at the top. *Ovary* 1-celled with 3 or 5 parietal placentas or 3-5-celled with axile placentas; styles free or connate; ovules usually many. *Capsule* septicidal or, when 1-celled, splitting through the placentas.

Shrubs 4-8 ft. high, with flowers 2-3 in. across :—

Styles exceeding the ovary in length; young branches 4-angled

1. *mysorensense*.

Styles much shorter than the ovary; young branches terete

2. *Hookerianum*.

Herbs with flowers under 1 in. across :—

Sepals with gland-tipped teeth3. *Wightianum*.

Sepals entire :—

Leaves sessile, auricled, 3-nerved; stamens monadelphous; ovary 1-celled.....4. *japonicum*.

Leaves shortly stalked, penninerved; stamens 3-adelphous; ovary 3-celled5. *humifusum*.

1. *HYPERICUM MYSORENSE*, Heyne; F. B. I. i. 253; W. & A. 99. *Norisca mysorensis*, Wt. Ic. t. 56.

W. Gháts in the Nilgiris Anamalais Pulneys and Travancore Hills, above 5,000 ft.

A large shrub, conspicuous on the open grassy "downs."

2. *HYPERICUM HOOKERIANUM*, W. & A. 99; F. B. I. i. 254; Wt. Ic. 949.

W. Gháts, Nilgiris above 7,000 ft.

A handsome shrub, rather scarce, in Shola forests.

3. *HYPERICUM WIGHTIANUM*, Wall.; W. & A. 99. *H. napaulense*, Dyer in F. B. I. i. 256 (excepting characters of pistil) *not of* Choisy.

W. Gháts in the Nilgiris and Pulneys, about 7,000 ft.

4. *HYPERICUM JAPONICUM*, Thunb.; F. B. I. i. 256; W. & A. 99.

N. Circars, Hills of Ganjam; W. Gháts from Nilgiris to Travancore, above 5,000 ft.

5. *HYPERICUM HUMIFUSUM*, Linn.; F. B. I. i. 255.

W. Gháts, in Nilgiris.

2. *Cratoxylon*, Blume.

Shrubs or trees. *Leaves* entire, thin. *Flowers* in terminal or axillary cymes. *Sepals* and *petals* each 5. *Stamens* 3- or 5-adelphous, the bundles separated by fleshy glands. *Ovary* 3-

celled; styles distinct; ovules 4-8 in each cell. *Capsule* dehiscent by 3 loculicidal valves. *Seeds* winged.

CRATOXYLON POLYANTHUM, Korth.; F. B. I. i. 257.

N. Circars, Anakapalle in Vizagapatam (Barber).

A glabrous shrub with fluted stems.

Family XXII. GUTTIFERAE.

Trees or shrubs with yellow or greenish juice. *Leaves* opposite or, rarely, verticillate, usually coriaceous and exstipulate. *Flowers* solitary or in axillary or terminal fascicles racemes or panicles, white yellow or red, regular, dioecious polygamous or hermaphrodite. *Sepals* and *petals* 4-12, imbricate in 2-3 series. σ . *Stamens* usually indefinite; filaments 1-6-adelphous or quite free. γ . *Staminodes* numerous, free or connate. *Ovary* 1-2- or many-celled; style 1 usually short or 0 or rarely styles 2; stigmas free or connate, often peltate, as many as the cells; ovules 1 or 2 or many, axile basal or rarely parietal. *Fruit* usually indehiscent and baccate, occasionally capsular. *Seeds* large; albumen 0; embryo with large radicle and small cotyledons or vice versa.

Ovary of many 1-ovuled cells; style short or 0; cotyledons minute or 0; veins of leaves often close, but never all equal and parallel:—

Calyx of 4-5 sepals.....1. **Garcinia.**

Calyx bursting into 2 valves2. **Ochrocarpus.**

Ovary 1-celled 1-ovuled or 2-celled 4-ovuled; styles 1 or 2, slender; cotyledons large; veins of leaves very close and parallel:—

Style 1; stigma peltate:—

Flowers racemose; ovary 1-celled, 1-ovuled3. **Calophyllum.**

Flowers solitary; ovary 2-celled, 4-ovuled4. **Mesua.**

Styles 2; stigmas acute; ovary 2-celled, 4-ovuled...5. **Poeciloneuron.**

1. **Garcinia**, Linn.

Trees or shrubs, often with yellow juice. *Leaves* coriaceous, sometimes only thinly so; stipules usually 0. *Flowers* solitary fascicled umbelled or panicked, polygamous or dioecious. *Sepals* 4-5. *Petals* 4-5, imbricate. σ . *Stamens* numerous, free or combined into a ring or an entire or 4-5-lobed mass, often surrounding a rudimentary ovary; filaments short and thick or 0; 2- or 4-celled anthers straight horseshoe-shaped or annular, dehis-

cence longitudinal or circumsciss. ♀. *Staminodes* free or connate in groups. *Ovary* 2-12-celled; stigma subsessile, peltate lobed or entire, smooth or tubercled; ovules solitary on the inner angle of each cell. *Berry* with tough rind enclosing several large seeds enclosed in a pulpy aril.

Flowers 4-merous :—

Leaves lanceolate to ovate :—

Stigma rayed :—

Flowers over 1·5 in. across; stamens in 4 masses...1. *Mangostana*.

Flowers under 1 in. across; stamens in 1 mass :—

Leaves oval, obtuse, with very close and parallel nerves

2. *echinocarpa*.

Leaves mostly lanceolate, acuminate, nerves not very close :—

Trees with ♂ flowers :—

Anthers peltate, circumsciss.....3. *Morella*.

Anther-cells contiguous, dehiscing longitudinally :—

Pedicels 1-1·5 in. long.....4. *indica*.

Pedicels ·3-·7 in. long; leaves usually oblanceolate obtuse5. *Cambogia*.

Anther-cells distant, adnate to a thick square connective; pedicels ·2-·3 in. long6. *Cowa*.

Trees with ♀ flowers :—

Staminodes in 4 bundles :—

Flowers shortly peduncled; ovary terete4. *indica*.

Flowers sessile; ovary grooved6. *Cowa*.

Staminodes in an irregular ring :—

Ovary terete; stigmas sessile3. *Morella*.

Ovary grooved; stigmas stalked5. *Cambogia*.

Trees with fruit :—

Fruit ·7 in. across3. *Morella*.

Fruit over 3 in. across :—

Fruit grooved to about the middle5. *Cambogia*.

Fruit grooved to the top6. *Cowa*.

Fruit not grooved4. *indica*.

Stigma entire; stamens monadelphous; leaves oblanceolate, caudate-acuminate, cuneate at the base; veins close, ascending ...7. *Imberti*.

Leaves linear-lanceolate or linear-oblong :—

Leaves caudate; veins distant, ascending; stigma rayed

8. *Wightii*.

Leaves blunt; veins close, transverse; stigma entire

9. *travancorica*.

Flowers 5-merous, from the axils of fallen leaves :—

Leaves 9-18 in. long, linear-oblong; pedicels 1-1.5 in. long; fruit pointed, 3-4 in. across.....10. *tinctoria*.

Leaves under 8 in. long; oval; pedicels .2-.5 in. long; fruit broadly oblong, 1-2 in. across :—

Flowers .5-1 in. across, opening in the cold season...11. *malabarica*.

Flowers .2-.3 in. across, opening in the hot season.....12. *spicata*.

1. GARCINIA MANGOSTANA, Linn.; F. B. I. i. 260.

Cultivated on the W. Coast and some other localities as at the Barliyar Garden on the E. Nilgiri slope. The Mango-steen.

2. GARCINIA ECHINOCARPA, Thwaites; F. B. I. i. 264.

Moist forests of S. Travancore and Tinnevely at 3,000 to 5,000 ft.

A handsome evergreen tree with hard reddish-brown wood. Vern. *Mal. Pára*.

3. GARCINIA MORELLA, Desr.; F. B. I. i. 264; Bedd. Fl. t. 86.

G. pictoria, Roxb.; Wt. Ic. t. 102; Bedd. Fl. t. 87.

G. elliptica, Wall.; Wt. Ic. t. 120. *G. Gutta*, Wt. Ill. i. 126.

W. Gháts from S. Canara and Mysore to Travancore up to 3,000 ft. The Indian Gamboge tree.

A moderate-sized tree of the evergreen forests with greyish-yellow very hard wood. The Gamboge is rarely, if at all, collected in India. Vern. *Tam. Makki*; *Mal. Chigiri*.

4. GARCINIA INDICA, Chois.; F. B. I. i. 261.

W. Gháts in S. Canara, Coorg and Wynaad, but no specimens seen.

A slender tree with drooping branches and edible fruit commonly planted in the Bombay Presidency as an oil producer (Cooke, Watt.).

5. GARCINIA CAMBOGIA, Desr.; F. B. I. i. 262; Roxb. Cor. Pl. iii.

t. 298; W. & A. 100; Bedd. Fl. t. 85. *G. papilla*, Wt. Ic. t.

960, 961. *G. conicarpa*, Wt. Ic. t. 121.

W. Gháts from Coorg to Travancore, up to 6,000 ft., in evergreen and lower Shola forests.

A common small evergreen tree; wood pale grey, not used.

Vern. *Tam. Kodakkapuli*; *Mal. Kodapuli*, Pinaru.

6. *GARCINIA COWA*, Roxb.; F. B. I. i. 262; W. & A. 101.

Nilgiris and elsewhere (Brandis); occurrence in the Peninsula doubtful (W. & A.)

7. *GARCINIA IMBERTI*, Bourd. in Journ. Bomb. Nat. Hist. Soc. xii. 349, Trees Trav. 24.

W. Gháts in S. Travancore above 3,000 ft.

A medium-sized tree with grey very hard wood, not used.

Vern. *Tam.* Manja kánji.

8. *GARCINIA WIGHTII*, T. Anders.; F. B. I. i. 265.

W. Ghát forests, in Coimbatore and Travancore up to 2,000 ft.

A small tree with white moderately hard wood, and a gamboge gum said to be soluble and of good quality.

Vern. *Mal.* Pali maranga.

9. *GARCINIA TRAVANCORICA*, Bedd. Fl. t. 173; F. B. I. i. 268.

W. Gháts, in the evergreen forests of S. Travancore and Tinnevely about 3,500 ft.

A medium-sized ornamental tree with yellowish-white wood having a small brown streaked heartwood. Vern. *Mal.* Malampongu.

10. *GARCINIA TINCTORIA*, Dunn. *G. Xanthochymus*, Hook. f.; F. B. I. i. 269. *Xanthochymus pictorius*, Roxb. Cor. Pl. ii. t. 196 (not *Garcinia pictoria*, Roxb.); Bedd. Ic. t. 88. *X. tinctorius*, DC.; W. & A. 102.

N. Circars, Mahendragiri Hill in Ganjam, 4,500 ft.; W. Gháts in Mysore, Coorg, Nilgiris and N. Travancore up to 3,500 ft.

A handsome evergreen tree with greyish-brown very hard wood. Vern. *Mar.* Jharambi; *Tel.* Iwara mamadi; *Tam.* Mukki; *Kan.* Deva garige; *Mal.* Anavaya.

11. *GARCINIA MALABARICA*, Talbot in Journ. Bomb. Nat. Hist. Soc. xi. 234, t. 1. *G. ovalifolia*, Hook. f. var. *macrantha*, Anders. in F. B. I. i. 269.

W. Gháts in S. Canara, Mysore and Coimbatore.

A small or moderate-sized tree.

12. *GARCINIA SPICATA*, Hook. f. *G. ovalifolia*, Hook. f.; F. B. I. i. 269. *Xanthochymus ovalifolius*, Roxb.; W. & A. 102. *X. spicatus*, W. & A. 102.

E. Coast in various places as in Ganjam and Nellore; common in Striharikota forest, S. Arcot and Pudukota;

W. Gháts and W. Coast from S. Canara to Travancore at low elevations only.

An elegant moderate-sized evergreen tree with yellowish-white hard wood. Vern. *Mar.* Haldi; *Tam.* Kokottai; *Mal.* Manja nángu.

2. Ochrocarpus, Thouars.

Trees with thick leaves and flowers solitary or fascicled on nodes in the axils of fallen leaves. *Calyx* bursting into 2 or 3 valves which are reflexed during flowering. *Petals* 4. *Stamens* many, free or nearly so; anthers erect, oblong. *Ovary* 2-celled; style subulate; stigma 3-lobed; cells 2-ovuled. *Berry* ovoid, mucronate, 1-seeded, stipitate. *Seed* large; embryo with large radicle (tigellus) and cotyledons small or 0.

OCHROCARPUS LONGIFOLIUS, Benth. & Hook. f.; F. B. I. i. 270; Bedd. Fl. t. 89. *Calysaccion longifolium*, Wt. Ic. t. 1999.

A tree with large oblong leaves and clusters of white flowers .7 in. across; berries 1 in. long.

W. Gháts in Malabar and Coimbatore; cultivated in N. Circars and elsewhere.

A large evergreen tree with hard red wood. Vern. *Mar.* Suringi; *Kan.* Wúndi, Punay, Suringi.

3. Calophyllum, Linn.

Trees. *Leaves* opposite, coriaceous, with very close numerous parallel nerves at right angles with the midrib. *Flowers* polygamous, solitary fascicled racemed or paniced, axillary or terminal. *Sepals* and *petals* usually 4 each, imbricate. *Stamens* many, free or connate at base; anthers erect, dehiscence longitudinal. *Ovary* 1-celled; style slender; stigma peltate; ovule 1, erect. *Drupe* with a fleshy or crustaceous pericarp. *Seed* ovoid or globose.

Perianth segments 4 only; petioles under .5 in. long; fruit elliptic, .5 in. long.....1. *decipiens*.

Sepals and petals 4 each; petioles .5-1 in. long; fruit 1 in. long:—

Leaves under 2 in. broad; fruit ovoid, apiculate:—

Young parts more or less tomentose; inflorescence pubescent; leaves 3-5 in. long.....2. *elatum*.

Whole tree glabrous; leaves under 2 in. long.....3. *trapezifolium*.

Leaves 2-3 in. broad; whole tree glabrous; fruit 1 in. in diam., globular.....4. *inophyllum*.

1. *CALOPHYLLUM DECIPIENS*, Wight Ic. t. 106. *C. Wightianum*, Wall.; F. B. I. i. 274; Bedd. Fl. t. 90. *C. spurium*, W. & A. 103 (*probably not of Choisy*).

Forests of W. Gháts from Mysore to Travancore at low elevations up to 1,000 ft.; banks of rivers and backwaters on W. Coast.

A moderate-sized tree with reddish-brown useful wood. Vern. *Mar.* Bobbi; *Kan.* Irai; *Mal.* Cherupinna.

2. *CALOPHYLLUM ELATUM*, Bedd. Fl. t. 2. *C. tomentosum*, T. Anders. F. B. I. i. 274 (*partly, not of Wight*).

W. Gháts from Nilgiris to Travancore and Tinnevely, at 1,000 to 5,000 ft.; W. Coast from S. Canara southwards.

The Poon Spar tree of India. A tall evergreen tree, unbranched to a great height with deeply cracked yellow bark and reddish-brown wood, used for masts of native vessels, but not in very great demand. Vern. *Tam.* Katta pinnei; *Mal.* Katta pinna, pinnapai.

3. *CALOPHYLLUM TRAPEZIFOLIUM*, Thw.; F. B. I. i. 275.

Evergreen forests of S. Travancore and Tinnevely at about 4,000 ft.; S. Canara.

4. *CALOPHYLLUM INOPHYLLUM*, Linn.; F. B. I. i. 273; W. & A. 103: Wt. Ill. i. t. 77.

E. and W. Coasts, a littoral species, much cultivated and often found run wild, perhaps not truly indigenous in India.

The Alexandrian Laurel. A moderate-sized very ornamental tree with a reddish-brown useful wood. The fruits are collected and sold for the extraction of oil. Vern. *Hind.* Sultana champa; *Ur.* Poonang; *Mar.* Undi; *Tam.* Pinnai; *Tel.* Púna; *Mal.* Pinna.

4. *Mesua*, Linn.

Trees. *Leaves* opposite, thick, often with transparent dots; nerves very numerous and slender, at right angles to the midrib. *Flowers* polygamous or hermaphrodite, large, solitary or in pairs, axillary or terminal. *Sepals* 4. *Petals* 4. *Stamens* numerous; anthers large, elongated, erect. *Ovary* 2-celled; style long; stigma peltate; 2 erect ovules in each cell. *Fruit* usually woody, subtended by the lignified sepals, 1-celled, tardily 2-4-valved. *Seeds* 1-4, without an aril.

MESUA FERREA, Linn.; F. B. I. i. 277; W. & A. 102; Wt. Ic. t. 118. *M. speciosa*, Chois.; Wt. Ic. t. 961. *M. pedunculata*, Wt. Ic. t. 119. *M. coromandelina*, Wt. Ic. t. 117; Bedd. Fl. t. 64.

A medium-sized or large tree with lanceolate, oblong or linear leaves, white fragrant flowers and ovoid greenish woody fruit. The size of the leaves (2-6 in. long), their colour beneath (white or green), the diameter of the flowers (1-4 in.) and of the fruit (1-2.5 in.) are very variable.

Forests of the W. Gháts from S. Canara to Travancore, up to 5,000 ft.

A common, handsome, and conspicuous tree with a very hard red wood, so hard that it is difficult to work, and therefore little used. Vern. *Tel.* Naga kesara; *Mar.* Nagchampa; *Kan.* Naga sampige; *Tam.* Nángu; *Mal.* Nánga.

5. Poeciloneuron, Bedd.

Trees. *Leaves* linear-oblong to lanceolate, thick; nerves close-set and parallel with fine reticulation between them. *Flowers* yellowish. *Sepals* 4-5, imbricate. *Petals* 5-6, contorted. *Stamens* numerous; filaments free or nearly so, short or 0; anthers elongated, erect. *Ovary* 2-celled; styles 2, subulate, stigmatic at the tips; ovules 2 in each cell, ascending. *Capsule* ovoid, 1-celled, 1-seeded. *Seed* exalbuminous; cotyledons fleshy; radicle minute, inferior.

Flowers in a terminal panicle; sepals 5; anthers lobulate on the margins1. *indicum*.

Flowers solitary, axillary; sepals 4; anthers plain on the margins

2. *pauciflorum*.

1. POECLONEURON INDICUM, Bedd.; F. B. I. i. 278; Bedd. Fl. t. 3.

W. Gháts from S. Canara and Mysore to Travancore up to 4,000 ft.

A large evergreen sometimes gregarious tree with a hard reddish-brown wood, useful for large timber purposes.

Vern. *Kan.* Kirballi; *Tam.* Puthangkolli; *Mal.* Vayila.

2. POECLONEURON PAUCIFLORUM, Bedd. Fl. t. 93; F. B. I. i. 278.

W. Ghâts of Travancore and Tinnevely at 2,000 to 4,500 ft.

A large evergreen tree with a hard reddish wood. Vern. *Tam*. Puthangkolli; *Mal*. Puli vayila.

Family XXIII. TERNSTROEMIACEAE.

Trees or shrubs, sometimes climbing. *Leaves* usually coriaceous and simple, alternate, penninerved, serrate or entire, rarely stipulate. *Flowers* axillary, solitary or fascicled, or in terminal or axillary racemes or panicles or springing from the trunk, regular, 2- rarely 1-sexual. *Sepals* usually 5, free or shortly connate, imbricate or very rarely valvate. *Petals* usually 5, usually connate and much imbricate. *Stamens* usually indefinite and adnate to the base of the petals, sometimes monadelphous; 2-locular, erect, basifixed. *Disk* 0. *Ovary* free or rarely $\frac{1}{2}$ -inferior, 3-5-many-celled; styles as many as the cells, free or connate. *Ovules* 1, 2 or many in each cell. *Fruit* a berry or capsule. *Seeds* with or without albumen.

Leaves entire, obovate, obtuse; flowers .8 in. across; fruit a large berry.....1. **Ternstroemia**.

Leaves crenate or serrate :—

Flowers very small in axillary fascicles; fruit a berry.....2. **Eurya**.

Flowers 1.5 in. across, solitary; fruit dehiscing by 5 valves spreading from a central column3. **Gordonia**.

1. *Ternstroemia*, Linn.

Glabrous evergreen trees or sometimes shrubs. *Leaves* coriaceous, usually entire. *Flowers* usually dioecious, solitary or fascicled, axillary or lateral; peduncles often recurved and 2-bracteate. *Sepals* 5. *Petals* 5, connate at the base like the sepals, broadly imbricate. *Stamens* in the σ and bisexual flowers numerous. *Ovary* 2-3-celled, rarely incompletely so; cells usually 2-ovulate; ovules pendulous; stigmas 2-3, subsessile, often lobed. *Berry* with a thick rind. *Seeds* large, horseshoe-shaped or oblong; albumen rarely absent.

TERNSTROEMIA JAPONICA, Linn.; F. B. I. i. 280. *Cleyera gymnanthera*, W. & A. 87; Wt. Ic. t. 47; Bedd. Fl. t. 91.

Flowers pale yellow, .7 in. across, in the axils of the leaves or of fallen leaves or lateral on the branchlets. Berries 2-seeded,

reddish, apiculate, .5 in. in diam. Leaves obovate, 2-4 in. long.

W. Gháts, in Shola forests of Nilgiris to Travancore, above 3,000 ft.

A moderate-sized evergreen handsome tree with reddish-brown smooth wood. Vern. *Nilg.* Kiamonu.

2. *Eurya*, Thunb.

Shrubs or small trees. *Leaves* glabrous or slightly pubescent, usually crenate-serrate. *Flowers* dioecious, in small axillary clusters or, rarely, solitary; pedicels short. *Sepals* and *petals* 5 each, imbricate, expanding but little. *Stamens* in ♂ flower 5-15, usually about 12. *Ovary* 2-5-celled, with as many free or united styles; ovules many, from the axis in each cell. *Fruit* a small globular or ovoid berry. *Seeds* usually very small, angled or pitted; albumen fleshy.

EURYA JAPONICA, Thunb.; F. B. I. i. 284; Bedd. Fl. t. 92.

E. tristyla, W. & A. 86. *E. Wightiana*, Wt. Ill. i. t. 38.

A shrub or tree with small white flowers, 2 together; ends of twigs sharply angular.

W. Gháts, in Shola forests from S. Canara to Travancore, common above 3,000 ft.

Wood brown, close-grained, a good fuel. Vern. *Nilg.* Huluni.

3. *Gordonia*, Ellis.

Trees, sometimes large, with evergreen leaves. *Flowers* solitary, axillary, usually towards the ends of the branches. *Sepals* usually 5, unequal and often passing gradually into the bracteoles. *Petals* sometimes much larger than the sepals and thin in texture. *Stamens* many, 1- or 5-adelphous, adnate to the base of the petals. *Ovary* 3-6-celled; style usually solitary, ribbed or angled with a spreading stigma; ovules 4-8 in each cell. *Fruit* an oblong, woody, loculicidal capsule with 4-5 flat or grooved valves separating from a persistent axis. *Seeds* winged; albumen 0; embryo with ovate cotyledons.

GORDONIA OBTUSA, Wall.; F. B. I. i. 291; W. & A. 87; Wt. Ill. i. t. 39.

A tall tree with grey bark and large white flowers.

W. Gháts, in all Districts in the drier Shola forests, chiefly

of the E. side, usually from 5,000 to 7,000 ft., lower in Travancore.

Wood reddish, hard and close-grained, but little used. Vern. *Nilg. Nageetta*.

Camellia Thea, Link., the Tea Plant, is much cultivated, especially in the Nilgiri and Travancore Mountains.

Family XXIV. DIPTEROCARPACEAE.

Resinous trees. *Leaves* alternate, entire or rarely crenate, penninerved, usually with small stipules. *Flowers* regular, hermaphrodite, usually sweet-scented, in racemes or panicles. *Calyx* free and campanulate or short and adnate to the ovary. *Petals* contorted. *Stamens* numerous, 15, 10 or 5, variously connate or free; filaments usually short and often dilated below; connective often produced into an appendage above. *Ovary* usually slightly adherent to the calyx, 3 (-1)-celled; style usually quite entire; ovules lateral or basal, 2 in each cell. *Fruit* an indehiscent nut or a 3-valved capsule usually enclosed in the accrescent calyx and often winged by the elongation of 2 or more of the sepals. *Seeds* 1(-2), exalbuminous; cotyledons fleshy.

Stipules amplexicaul, scars encircling the twigs; calyx tubular; fruit with 2 long wings1. **Dipterocarpus.**

Stipules not amplexicaul; sepals nearly free:—

Bases of the inner sepals nearly hidden by the outer in flower and fruit; sepals erect in fruit and enclosing the nut; anthers with long awns (except in *Shorea robusta* and *S. Tumbuggaia*):—

Sepals developing in fruit into long erect wings:—

Wings 2.....2. **Hopea.**

Wings 33. **Shorea.**

Sepals accrescent but shorter than the fruit or developing into short spreading wings.....4. **Balanocarpus.**

Bases of the sepals equally exposed in flower and fruit; anther points short or 0:—

Sepals ovate-lanceolate, acuminate; flowers in axillary racemes

5. **Yatica.**

Sepals linear, obtuse; flowers in terminal panicles6. **Yateria.**

1. **Dipterocarpus**, Gaertn. f.

Trees, often of great height, more or less clothed with tawny stellate pubescence. *Leaves* coriaceous, margins entire or undu-

late, lateral nerves looped and connected by transverse reticulation; petiole often swollen just below the leaf-blade; stipules encircling the stem, falling early and leaving an annular scar. *Flowers* large, white or reddish, racemed or panicle. *Calyx* with a free tubular base. *Petals* valvate, pubescent. *Stamens* numerous; anthers elongated, acuminate. *Ovary* with 3 2-ovuled cells and a filiform style. *Fruit* a 1(-2)-seeded nut, enclosed in a smooth, ribbed, or reticulate accrescent calyx-tube with 2(-5) erect wings. *Cotyledons* large, thick, unequal.

Tube of fruiting calyx 5-winged; leaf-nerves below and young shoots clothed with spreading tomentum1. *Bourdillonii*.
 Tube of fruiting calyx smooth; leaves subglabrous; young shoots with short adpressed tomentum.....2. *indicus*.

1. DIPTEROCARPUS BOURDILLONI, Brandis in Hook. Ic. Pl. t. 2403.

W. Gháts: Carcoor Ghát in Malabar; N. and C. Travancore at low elevations.

A magnificent evergreen tree, reaching 150 ft. in height. Wood reddish brown, moderately hard. Vern. *Tam.* Kar ánjili; *Mal.* Charatta ánjili.

2. DIPTEROCARPUS INDICUS, Bedd.; Bedd. Fl. t. 94.

W. Coast and W. Gháts from S. Canara to Tinnevely, up to 3,000 ft., in evergreen forests.

A lofty evergreen tree, reaching 120 ft. in height. Wood reddish brown, hard, but not durable. Vern. *Kan.* Guga, Challane; *Tam.* Ennei; *Mal.* Kalpayin, Vellaini.

2. Hopea, Roxb.

Large resinous trees. *Leaves* entire; stipules small, deciduous. *Flowers* sessile or shortly pedicelled, ebracteate, in lax unilateral paniculate racemes. *Sepals* obtuse, imbricate, shortly united at the base. *Stamens* 15 or rarely 10, slightly connate; connective produced into a subulate point; anthers ovate. *Ovary* of 3 2-ovuled cells; style short, subulate. *Fruit* 1-seeded, closely surrounded by the bases of the accrescent sepals, the 2 external of which are developed into linear or oblong wings.

Panicles tomentose; leaves with 8-12 pairs of nerves:—

Petals glabrous; leaves ovate to oblong; wings of fruit 2·5 in. long, erect1. *parviflora*.

Panicles glabrous; petals pubescent:—

Leaf-nerves 4-5 pairs; bark black, peeling in strips from below upwards; fruit-wings .6-.9 in. broad.....2. *racophloea*.

Leaf-nerves 6-12 pairs; bark brownish; fruit-wings .3-.4 in. wide

3. *Wightiana*.

1. *HOPEA PARVIFLORA*, Bedd.; F. B. I. i. 308; Bedd. Fl. t. 7.

Moist forests of the W. Coast and W. Gháts in all Ghát Districts, up to 3,000 ft.; often gregarious in hill forests, sporadic on river banks in plains ones.

A large handsome tree, with brown close-grained hard wood, valuable for building purposes and for railway sleepers Vern. *Kan.* Bovumara, Kiralboghi; *Tam.* Kóngu, Pongu; *Mal.* Thambagam.

2. *HOPEA RACOPHLOEA*, Dyer in F. B. I. i. 310. *H. malabarica*, Bedd. Ic. t. 185.

W. Gháts in the forests of S. Canara, Wynaad, and Travancore, up to 3,000 ft.

A moderate-sized tree with hard brown wood and characteristic bark. Vern. *Tam.* Karung kongu; *Mal.* Neduváli kongu.

3. *HOPEA WIGHTIANA*, Wall.; F. B. I. i. 309; W. & A. 85. *H. glabra*, W. & A. 85; F. B. I. i. 310; Bedd. Fl. t. 96.

Evergreen forests of the W. Coast from S. Canara southwards, often gregarious, especially in S. Canara.

A large tree with brown hard wood of good quality for timber. Vern. *Mar.* Kavsi; *Kan.* Haiga; *Tam.* Ila pongu.

3. *Shorea*, Roxb.

Resinous trees of great height or rarely of medium size or even shrubs. *Leaves* with the ultimate reticulation often inconspicuous; stipules often large, coriaceous or persistent. *Panicles* axillary or terminal. *Sepals* imbricate, united at the base into a very short tube. *Stamens* often 15 in 3 rows, rarely fewer, sometimes more numerous and occasionally as many as 100; anthers usually ovate or oblong with a subulate extension of the connective. *Ovary* of 3 2-ovuled cells; style subulate; stigma entire or minutely lobed. *Fruit* with a leathery, rarely woody, pericarp, 1-celled, 1-seeded, closely surrounded by the bases of the persistent, usually accrescent, sepals, the 3 outer of which (or rarely 5 or 0) are developed

into 7-10-veined reticulate membranous linear-oblong wings. *Cotyledons* fleshy, unequal.

Calyx glabrous in flower and fruit; stamens usually about 15; leaves elliptic with nerves close, under .25 in. apart1. *Talura*.

Calyx pubescent in flower and fruit; stamens usually 30-50; leaves ovate, often cordate at base:—

Peduncle and rachis of panicle densely tomentose; petioles under 1 in. long; wings of fruit 6-8 times as long as the capsule; leaf-nerves usually over .5 in. apart; very gregarious.....2. *robusta*.

Peduncle and rachis of panicle nearly glabrous; petioles 1-2 in. long; wings of fruit 2-3 times as long as the capsule; leaf-nerves usually .25-.35 in. apart; sporadic or only partly gregarious...3. *Tumbuggaia*.

1. SHOREA TALURA, Roxb.; F. B. I. i. 304. *S. laccifera*, Heyne; Bedd. Fl. t. 6. *Vatica laccifera*, W. & A. 84; Wt. Ic. t. 164.

Forests of the E. Gháts and Deccan in Cuddapah, N. Arcot, Anantapur, Mysore, and Salem, up to 3,000 ft.; W. Gháts in Malabar, Coimbatore, and Madura, sporadic only and in hilly country.

A handsome tree with yellowish-brown valuable wood. Vern. *Tel.* Jalári; *Tam.* Talura, Talari.

2. SHOREA ROBUSTA, Gaertn.; F. B. I. i. 306; Roxb. Cor. Pl. iii. 312; Bedd. Fl. t. 4; Brand. For. Fl. t. 9.

N. Circars, forming large forests in Gumsúr Surada and the E. Ghát Range, up to 3,000 ft.; Palkonda Hills and Jeypore forests in Vizagapatam, and south to the Godavari, but scarce. The Sal tree.

A large gregarious forest tree with a brown but rough and rather cross-grained wood, valuable for building purposes and sleepers. Vern. *Hind.* Sal; *Ur.* Salwa; *Tel.* Gugal.

3. SHOREA TUMBUGGAIA, Roxb.: F. B. I. i. 306; Bedd. Fl. t. 5. *Vatica Tumbuggaia*, Wt. Ic. t. 27.

E. Gháts: forests of the Cuddapah, N. Arcot, and Chingleput Hills, up to 3,000 ft.

A large forest tree, sporadic or only partly gregarious, with a brown hard wood similar to Sal but much smoother and better for carpentry. It is much in demand in Cuddapah and N. Arcot. Vern. *Tam.* Tambagam; *Tel.* Thamba.

4. *Balanocarpus*, Bedd.

Large trees, glabrous except the inflorescence. *Leaves* entire with minute deciduous stipules. *Flowers* in unilateral paniced racemes. *Calyx* lobes imbricate on a flat torus. *Stamens* (10–15; filaments dilated at the base; anthers short, ovate, exceeded by the apical awn. *Nut* oblong or globose, apiculate, often marked by numerous raised lines, enclosed at the base by the thickened and accrescent sepals which often attain 1 in. in length and spread horizontally.

Leaves unequally cordate at the base; petals bilobed; fruit ovoid

1. *erosa*.

Leaves rounded at the base or acute; petals entire, pubescent, crenulate; fruit globose 2. *utilis*.

1. *BALANOCARPUS EROSA*, Bedd. For. Man. 237; Fl. t. 329.

Tinnevely Gháts, at 2,000 to 3,000 ft.

2. *BALANOCARPUS UTILIS*, Bedd. For. Man. 237; Fl. t. 330.

Hopea longifolia, Dyer, F. B. I. i. 309.

Tinnevely Gháts, S. of Courtallum, at 1,000 to 3,000 ft.

5. *Vatica*, Linn.

Large or medium-sized resinous trees. *Leaves* coriaceous, entire or a little undulate, finely reticulate; stipules small and caducous. *Flowers* axillary and terminal, usually paniculate and tomentose. *Calyx-tube* very short, adnate to the base of the ovary; segments slightly imbricate. *Stamens* 15; anthers oblong, apiculate. *Ovary* of 3 2-ovuled cells; style short; stigma entire or shortly 3-toothed. *Capsule* leathery, 3-valved, 1–2-seeded, attached to the spreading and often winged accrescent calyx.

VATICA CHINENSIS, Linn. *V. Roxburghiana*, Bl.; F. B. I. i. 302; Bedd. Fl. t. 95. *Vateria Roxburghiana*, Wt. Ic. t. 26.

A large evergreen tree with thin grey bark and ovate to oblong obtuse leaves having 10–14 pairs of nerves; petals 5 times as long as the calyx; stamens in 2 rows; fruit globose, shortly pointed, reticulate, surrounded at the base by the enlarged sepals.

W. Coast and W. Gháts at low elevations on the banks of rivers from S. Canara and Mysore to Travancore.

Wood reddish brown, hard and good, but little used. Vern. *Mal.* Vellei payin, Adakka payin.

6. *Vateria*, Linn.

Resinous trees. *Leaves* usually coriaceous. *Flowers* in terminal or lateral panicles or 1-3 on axillary peduncles. *Calyx* segments very shortly united at the base. *Stamens* 15 or about 50; anthers linear or oblong, connective usually mucicous. *Ovary* of 3 2-ovuled cells; style subulate, entire or shortly lobed. *Capsule* 1-seeded, ovoid or globose, coriaceous or fleshy, indehiscent or 3-valved; calyx persistent, scarcely accrescent, reflexed around the pedicel. *Cotyledons* large, fleshy, unequal, enclosing the superior radicle.

VATERIA INDICA, Linn.; F. B. I. i. 313; Roxb. Cor. Pl. iii. t. 288; W. & A. 84; Wt. Ill. i. t. 36. *V. malabarica*, Bl.; Bedd. Fl. t. 84.

A very large evergreen tree; stem smooth, blotched with green and white; leaves ovate, with 14 pairs of nerves; flowers 8 in. across, white, fragrant, drooping in large panicles; fruit ovoid, rough, pale brown, 2 in. long.

Evergreen forests of the W. Gháts from S. Canara to Tinnevely at low elevations, up to 2,500 ft. or sometimes higher, often planted. The Piney Varnish or Indian Copal tree.

Wood greyish brown, rough, not much used. The stems afford a resin and the seeds an oil. Vern. *Kan.* Dhupa, Gugli; *Tam.* Vallei kuntrikam; *Tel.* Dupada; *Mal.* Payin.

Family XXV. ANCISTROCLADACEAE.

Glabrous climbing shrubs with hooked branches. *Leaves* with entire coriaceous blades and short petioles; nerves pinnate and reticulate; stipules small and deciduous or 0. *Flowers* regular, bisexual, in axillary or (apparently) terminal racemes or panicles, mostly caducous; pedicels jointed at the top. *Calyx* enlarged in fruit; tube very short, adnate to the ovary; lobes 5, unequal, imbricate. *Petals* 5, unequal, contorted, slightly connate at the base. *Stamens* 5-10; filaments short, dilated at the base and there connate; anthers introrse. *Ovary* 1-celled, with one erect or lateral ovule; styles 3; stigmas terminal. *Nut* indehiscent, 1-seeded, mucronate, adnate to the calyx tube, and surmounted by the enlarged calyx lobes. *Seed* globose; albumen copious, fleshy, ruminant.

Ancistrocladus, Wall.

Flowers in branched panicles. *Stamens* 10. Other characters as described under the Family.

ANCISTROCLADUS HEYNEANUS, Wall. ; F. B. I. i. 299 ; Wt. Ic. t. 1987-8.

W. Gháts, in most Districts, in evergreen forests.

Family XXVI. MALVACEAE.

Herbs, shrubs or rarely trees ; stellate hairs often present. *Leaves* alternate, usually palmately nerved, simple lobed or digitate ; stipules free, caducous or 0. *Flowers* regular, bisexual or very rarely dioecious or polygamous, axillary, terminal, solitary, clustered or paniculate ; bracteoles 2 or more, free or connate, often forming an involucre, sometimes 0. *Sepals* (3-4-)5, valvate, more or less united into a lobed or truncate calyx. *Petals* 5, more or less adnate to the base of the staminal tube, twisted-imbricate or 0. *Stamens* many, rarely few, usually connate into a tube divided at the apex into numerous single pentadelphous or polyadelphous antheriferous filaments, or emitting from its outer surface sessile or stipitate anthers ; anthers ultimately 1-celled. *Ovary* 2-many-celled, entire or lobed, of 2-many carpels ; ovules 1 or more in each cell on the axis ; styles distinct or connate ; stigmas linear peltate or capitate. *Fruit* of dry indehiscent cocci separating from the central axis, or capsular and loculicidal, or rarely large woody and indehiscent. *Seeds* reniform or obovoid ; albumen scanty or 0 ; embryo curved ; cotyledons usually folded or crumpled.

Plants destitute of peltate scales :—

Leaves simple, entire, lobed, or palmatifid :—

Carpels separating from the axis at maturity :—

Styles as many as the carpels ; staminal tube antheriferous at or to the top :—

Bracteoles 3 :—

Carpels rounded, indehiscent, awnless :—

Leaves orbicular in outline, palmately veined and lobed ; stigmas linear ; flowers purple or whitish1. **Malva**.

Leaves lanceolate, pinnately veined stigmas capitate ; flowers yellow2. **Malvastrum**.

Carpels truncate, dehiscent, 2 awned**Modiola**.

Bracteoles 0:—

Fruiting carpels spreading star-wise with points outwards; fruiting calyx flat; flowers purple **Anoda.**

Fruiting carpels erect, with the fruiting calyx appressed to them; flowers yellow:—

Carpels bursting irregularly, points not spreading; flowers opening in the morning.....3. **Sida.**

Carpels dehiscent by a regular central line, forming a flat-topped fruit with radiating points; flowers opening in the evening4. **Abutilon.**

Style-branches twice as many as the carpels; staminal tube antheriferous on the outside not at the top:—

Flowers capitate, 4-6 together in each involucre **Malachra.**

Flowers not in heads:—

Leaves with a large gland at the base of the midrib beneath; bracteoles or lobes of the involucre triangular-lanceolate; ripe carpels often glochidiate5. **Urena.**

Leaves eglandular; bracteoles or lobes of the involucre ovate or setaceous; ripe carpels never glochidiate, but 1-3-aristate or bare6. **Pavonia.**

Carpels not separating; fruit capsular:—

Bracteoles persistent and forming spreading wings to the fruit; anthers in 5 clusters; flowers polygamous7. **Kydia.**

Bracteoles not spreading nor fimbriate (0 at the time of flowering in *Hibiscus ficulneus*):—

Capsule 10-valved8. **Decaschistia.**

Capsule 5-valved9. **Hibiscus.**

Bracteoles large, cordate, foliaceous, fimbriate or toothed

Gossypium.

Leaves digitate; trees:—

Trunk short, thick, unarmed; peduncles pendulous, 6-8 in. long; calyx 5-fid; stamens monadelphous **Adansonia.**

Trunk tall, armed at least when young; peduncles under 2 in. long; calyx truncate; stamens 5-adelphous:—

Flowers over 3 in. long; capsule thick, woody; bark soon grey

10. **Bombax.**

Flowers 1-1.5 long; capsule thin, leathery; bark remaining green for a long time11. **Eriodendron.**

All herbaceous parts covered with peltate scales; trees:—

Flowers large, solitary, axillary; leaves cordate, ovate...12. **Thespesia.**

Flowers small (for the Family), densely clustered on the old wood; leaves linear-lanceolate13. **Cullenia.**

1. *Malva*, Linn.

Pubescent herbs. *Leaves* lobed. *Flowers* axillary, solitary or clustered, pedicelled. *Bracteoles* 3. *Staminal* tube divided at the top into numerous antheriferous filaments. *Ovary* many-celled; ovules 1 in each cell; styles as many as the cells, filiform. *Cocci* forming a round depressed fruit, separating when ripe from each other and from the axis, indehiscent, muticous.

Flowers 1·5 in. across, purple, on long peduncles; plant erect; petals 5 times as long as the sepals1. *sylvestris*.
Flowers not more than ·5 in. across, shortly stalked; petals scarcely exceeding the sepals:—

Erect plant with bluish flowers in dense axillary clusters; carpels rounded at the edge2. *verticillata*.
Low spreading plant with whitish flowers, few together on short peduncles in the leaf-axils; carpels with interlocking teeth; petal-claws glabrous3. *parviflora*.

1. MALVA SYLVESTRIS, Linn.; F. B. I. i. 320. *M. mauritiana*, DC.; W. & A. 45.

Mysore (Heyne 1800); Madras (Bulkley 1703), a weed of cultivation.

2. MALVA VERTICILLATA, Linn.; F. B. I. i. 320. *M. rotundifolia*, Wt. Ic. t. 950 (not of Linn.). *M. neilgherrensis*, Wt. Ic. t. 950 (in text).

Nilgiris, Kotagiri, 6,000 ft. (Wight), a weed of cultivation.

3. MALVA PARVIFLORA, Linn.; F. B. I. i. 321.

Mysore, Madura (Wall. Cat. 1884 f).

2. *Malvastrum*, A. Gray.

Herbs or shrubs. *Leaves* entire or lobed. *Flowers* axillary or in a leafy terminal spike; bracteoles 3, narrow. *Calyx* cup-shaped, 5-parted. *Petals* longer than the sepals. *Staminal* tube bearing anthers on the outside up to the top. *Ovary* 5- or more-celled; styles as many as the cells; stigmas capitate. *Cocci* free at maturity, indehiscent, 1-seeded. *Seeds* ascending.

MALVASTRUM COROMANDELIANUM, Garcke. *M. tricuspidatum*, A. Gray; F. B. I. i. 321. *Malva coromandeliana*, Linn. Sp. Pl. 687.

A small erect branched shrub; stem and branches covered with stiff appressed hairs.

Madras, Kurnool, etc., a weed of roadsides and waste places.

3. Sida, Linn.

Herbs or undershrubs, pubescent with simple or stellate hairs. *Leaves* toothed; stipules linear. *Flower* pedicels axillary, solitary or clustered, disarticulating in fruit at a joint below the calyx: bracteoles 0. *Sepals* 5, connate below. *Corolla* small, yellow or white. *Staminal* tube divided into numerous filaments at the top. *Ovary* 5-12-celled; ovules pendulous, 1 in each cell; styles as many as the carpels; stigmas terminal. *Fruit* depressed-globose, enclosed in the calyx; carpels separating from each other and from the axis. *Seeds* smooth. Fibre-yielding plants.

Whole plant velvety; awns of carpels exceeding the calyx, retrorse-hairy; carpels 101. *cordifolia*.
Plant pubescent or tomentose, not velvety; awns shorter than the calyx segments:—

Carpels 5; leaves cordate or truncate:—

Leaves acute; pedicels jointed in the middle:—

Stem trailing; leaves and slender branches sparingly hispid, not glutinous2. *veronicaefolia*.

Stem erect; leaves and stoutish branches glutinous...3. *glutinosa*.

Leaves obtuse; pedicels jointed near the flower4. *spinosa*.

Carpels 6-10 (rarely 5 in *S. acuta*); leaves cuneate:—

Leaves small, cuneate-obcordate, entire5. *Schimperiana*.

Leaves serrate:—

Leaves nearly glabrous; peduncle equal to the petiole ...6. *acuta*.

Leaves pubescent-hoary; peduncle longer than the petiole:—

Peduncle jointed in the middle half; carpels awned

7. *rhombifolia*.

Peduncle jointed at the base; carpels usually muticous

8. *rhomboidea*.

1. SIDA CORDIFOLIA, Linn.; F. B. I. i. 324; W. & A. 58.

A weed of roadsides and waste land, in all Districts.

2. SIDA VERONICAEFOLIA, Lam. *S. humilis*, Willd.; F. B. I. i. 322; W. & A. 59.

A weed of waste places in all plains Districts.

3. SIDA GLUTINOSA, Cav. *S. mysorensis*, W. & A. 59; F. B. I. i. 322. *S. urticaefolia*, W. & A. 59.

A weed of waste places in all plains Districts.

4. SIDA SPINOSA, Linn.; F. B. I. i. 323. *S. alba*, Linn.; W. & A. 58.

A weed of waste places in Deccan and Carnatic Districts,

5. SIDA SCHIMPERIANA, Hochst.; F. B. I. i. 322. *Riedleia truncata*, W. & A. 66 (not of DC.).

E. Coast Districts at Madras, S. Arcot; Deccan, not common.

6. SIDA ACUTA, Burm.; W. & A. 57; Wt. Ic. t. 95. *S. carpinifolia*, Linn. f.; F. B. I. 323.

A weed of waste places, very common in all plains Districts, often also in woods.

7. SIDA RHOMBIFOLIA, Linn.; F. B. I. i. 323 (partly).

A weed of waste places, in all plains Districts.

8. SIDA RHOMBOIDEA, Roxb.; W. & A. 57. *S. rhombifolia*, Linn. var. *rhomboidea*, Masters in F. B. I. i. 324.

W. Coast Districts, S. Canara to Travancore; Mysore.

4. Abutilon, Gaertn.

Tomentose shrubs or herbs. *Leaves* usually cordate and long-petioled, dentate, rarely slightly lobed. *Flowers* solitary or rarely racemose paniculate or umbellate, on axillary peduncles which are jointed near the top, yellow or orange; involucral bracteoles 0. *Calyx* of 5 valvate sepals, united below into a short tube. *Corolla* of 5 imbricate petals, adnate below to the staminal tube. *Stamens* numerous, free above. *Carpels* 5-many; styles as many as the carpels; stigmas small, capitate. *Ripe carpels* ultimately separating from the short central axis, dehiscent, 1-5-seeded, usually acute or mucronate. *Seeds* reniform. Fibre-yielding plants.

Carpels 5, twice as long as the acuminate sepals; staminal tube short, hairy at the top; flowers 1.5 in. across, in terminal panicles

1. *polyandrum*.

Carpels 8-10, hispid, .4 in. long; stem with close thin tomentum

2. *ramosum*.

Carpels 10-20 :—

Carpels pointed or mucronate :—

Stem with smooth close tomentum; carpels with thin tomentum and scattered tufts of stiff hairs, both eventually deciduous; seeds minutely furrowed, glabrous 3. *indicum*.

Stem with spreading hairs :—

Ripe carpels with dense spreading persistent shaggy hairs

4. *asiaticum*.

Ripe carpels shortly pubescent; seeds with minute white hairs

5. *hirtum*.

Carpels obtuse, without a mucro :—

Corolla 2 in. across; staminal tube pubescent; fruit densely silky
6. *glaucum*.

Corolla 5-1 in. across; staminal tube glabrous :—

Fruit four times longer than the sepals, drooping, membranous,
wrinkled7. *crispum*.

Fruit less than twice as long as the sepals8. *neilgherrense*.

1. ABUTILON POLYANDRUM, W. & A. 55 (*not of* G. Don); F. B. I. i. 325.

E. Gháts, Ganjam to Godavari; W. Gháts, from Mysore to the Pulneys.

A common erect woody herb.

2. ABUTILON RAMOSUM, Guill. & Perr.; F. B. I. i. 328; Cooke, Fl. Bomb. i. 98.

W. Coast, in Cochin (Meebold), a tall shrubby perennial.

3. ABUTILON INDICUM, G. Don; F. B. I. i. 326; W. & A. 56; Wt. Ic. t. 12.

Common in all Districts, especially in the hills.

An erect woody herb.

4. ABUTILON ASIATICUM, G. Don; F. B. I. i. 326; W. & A. 56.

E. Coast, in Chingleput District.

An erect herbaceous plant or small shrub.

5. ABUTILON HIRTUM, G. Don; W. & A. 56. *A. graveolens*, W. & A. var. *hirtum*, Masters in F. B. I. i. 327. *A. graveolens*, W. & A. 56.

Common in almost all Districts.

An erect woody herb of waste places.

6. ABUTILON GLAUCUM, Cav. *A. muticum*, G. Don; F. B. I. i. 327. *A. tomentosum*, W. & A. 56.

Bellary in the Deccan; Tinnevely; not common.

7. ABUTILON CRISPUM, G. Don; F. B. I. i. 327; W. & A. 56; Wt. Ic. t. 68.

Deccan, from Hyderabad southwards; Coromandel Coast Districts.

A weak diffuse annual.

8. ABUTILON NEILGHERRENSE, Munro ex Wt. Ill. i. 66.

Bellary in the Deccan; Nilgiri Hills (Munro).

5. Urena, Linn.

Herbaceous perennials, covered with harsh tomentum. *Leaves* angled or lobed, with a large gland at the base of the midrib below.

Flowers sessile or shortly pedicelled; involueral bracts 5, connate at the base, adnate to the calyx-tube. *Sepals* 5, connate below into a campanulate tube. *Petals* 5, united below to the staminal tube. *Stamens* united into a narrow tube, bearing sessile or shortly stalked anthers below the apex. *Ovary* of 5 1-ovuled cells; style branches 10; stigmas capitate. *Ripe carpels* 5, smooth or covered with glochidiate spines, separating from the short axis, indehiscent.

Ripe carpels glochidiate:—

Leaves with slight obtuse lobes1. *lobata*.

Leaves cut to the middle or beyond; lobes narrower at their base

2. *sinuata*.

Ripe carpels smooth; leaves roundish; flowers racemose ...3. *repanda*.

1. *URENA LOBATA*, Linn.; F. B. I. i. 329; W. & A. 46.

In most Districts, a weed of roadsides, forest clearings and waste places.

An undershrub, giving a fibre.

2. *URENA SINUATA*, Linn.; F. B. I. i. 329; W. & A. 46.

In most Districts, in woods and waste places, less common than the preceding.

An undershrub, giving a fibre.

3. *URENA REPANDA*, Roxb.; F. B. I. i. 330; W. & A. 46; Wt. Ill. i. 65.

N. Circars, in Ganjam Sál forests.

6. *Pavonia*, Cav.

Herbs or small shrubs. *Leaves* subentire, dentate, angled, lobed or pinnatifid. *Flowers* solitary, axillary or in terminal racemes; bracteoles 5 or many, free or a little connate at the base. *Calyx* 5-fid. *Petals* 5, connate at the base and adnate there to the staminal tube. *Stamens* monadelphous, becoming free in groups at various heights on the tube. *Ovary* of 5 1-ovuled cells; styles 10, with capitate stigmas. *Ripe carpels* separating from the axis, indehiscent or 2-valved, never glochidiate.

Bracteoles 5, ovate; carpels glabrous, muricate; flowers yellow

1. *procumbens*.

Bracteoles 8-12, setaceous; flowers pink or white:—

Carpels 3-angled, keeled at the edges, flat at the back, glabrous;

leaves more or less deeply lobed or pinnatifid2. *zeylanica*.
 Carpels rounded at the back, usually pubescent; leaves seldom deeply lobed.....3. *odorata*.

1. PAVONIA PROCUMBENS, Boiss. *P. glechomifolia*, Garcke;
 F. B. I. i. 330. *Lebretonia procumbens*, Wall.; W. & A.
 47; Wt. Ic. t. 4.

Most Districts of the Circars, Deccan and Carnatic, but not common.

A prominent undershrub.

2. PAVONIA ZEYLANICA, Cav.; F. B. I. i. 330; W. & A. 47.

Circars and Carnatic from Godavari southwards, not common.

An erect branching undershrub.

3. PAVONIA ODORATA, Willd.; F. B. I. i. 331; W. & A. 47.

N. Circars, Deccan and Carnatic, in waste places and open woods, common.

A herbaceous branching weed.

7. Kydia, Roxb.

Trees with stellate tomentum. *Leaves* palminerved and usually lobed. *Flowers* paniced, polygamous; the bracteoles, stamens and styles varying in the different sexual forms; bracteoles 4-6, obovate or spatulate, shorter or longer than the calyx, accrescent and spreading in fruit and forming dry spatulate wings. *Sepals* 5, divided to the middle into 5 ovate lobes, connivent and persistent over the fruit. *Petals* normally 5, unequally bilobed at the top. *Anthers* in clusters of 3-4 at the ends of 5 slender prolongations of the staminal tube or in ♀ flowers reduced in number or 0. *Ovary* with (2-)3 2-ovuled cells; style with 3 branches. *Capsule* 3-celled, loculicidal, depressed-globose, woolly. *Seeds* reniform, brown.

KYDIA CALYCINA, Roxb. Cor. Pl. iii. t. 215; F. B. I. i. 348; Wt. Ic. t. 879-80; W. & A. 70; Bedd. Fl. t. 3. *K. Roxburghiana*, Wt. Ic. t. 881. *K. fraterna*, Roxb. Cor. Pl. iii. t. 216; W. & A. 70.

Most Districts of the N. Circars and Deccan, in deciduous forests; scarce on the W. Coast.

A small or moderate-sized quick-growing tree with white soft wood of no value. Vern. *Hind.* Pula; *Ur.* Kopásia; *Mar.* Warang; *Tel.* Potri; *Kan.* Bendi.

8. *Decaschistia*, W. & A.

Tomentose shrubs. *Leaves* entire, serrate or lobed. *Flowers* shortly peduncled, axillary, solitary or clustered; bracteoles 10. *Sepals* 5, a little coherent at the base, lobes narrow, acute or acuminate. *Petals* connate at the base and adherent to the base of the staminal tube, broader above and twisted in imbrication. *Stamens* becoming free from the staminal tube at various heights. *Ovary* 10-celled, cells 1-ovuled; style divided near the top into 10 branches, with capitate stigmas. *Capsule* loculicidally 10-valved, depressed-globose. *Seeds* reniform.

Middle and lower leaves deeply trilobed; bracteoles not much more than half the length of the calyx1. *triloba*.

Middle and lower leaves ovate or lanceolate :—

Leaves ovate, rounded or rarely obtuse at the apex, nearly entire; stem with rough spreading reddish hairs; seeds slightly pubescent

2. *rufa*.

Leaves ovate-lanceolate, acute, serrate or nearly entire, stem usually with short white tomentum; seeds quite glabrous.....3. *crotonifolia*.

1. *DECASCHISTIA TRILOBA*, Wt. Ic. t. 88; F. B. I. i. 332.

W. Gháts in S. Canara and Mysore.

An erect shrub.

2. *DECASCHISTIA RUFA*, Craib in Kew Bull. 1912, 35.

Carnatic, Tiruvallur and Kambakam Hill in Chingleput (Cleghorn), Peninsula (Wall. Cat. 1901 *in part*).

3. *DECASCHISTIA CROTONIFOLIA*, W. & A. 52; F. B. I. i. 332 (partly); Wt. Ic. t. 42.

Deccan, in open forests in Bellary, Mysore, Salem and Cuddapah, up to 2,500 ft.; E. side of W. Gháts in Nilgiris and Pulneys.

An erect shrub with large flowers.

9. *Hibiscus*, Medik.

Herbs, shrubs or rarely trees. *Leaves* stipulate, usually palmately lobed or cut. *Flowers* axillary, or rarely in a terminal raceme. *Bracteoles* 4–12 or rarely 0, usually free from each other and from the calyx. *Calyx* 5-lobed or 5-fid, valvate or spathaceous or circumsciss. *Petals* 5, connate at the base and adnate to the

staminal tube. *Staminal tube* truncate or 5-toothed at the top, giving off the free ends of the stamens at various heights. *Ovary* 5-celled; ovules 3 or more in each cell; styles 5, connate below; stigmas usually capitate. *Capsule* loculicidally 5-valved, 5-celled or rarely spuriously 10-celled. *Seeds* reniform globose or obovoid, glabrous velvety cottony or scaly.

Calyx spathaceous, splitting down one side and falling off at flowering-time; seeds striated; flowers yellow or white:—

Bracteoles linear, more than 6; seeds glabrous:—

Capsules lanceolate, narrowed to the base, 1–3 in. long; peduncles as long as the capsules; seeds .15 in. long, nearly globular

1. *Abelmoschus*.

Capsule elongate, attenuate above, truncate at the base, 6–10 in. long; peduncle many times shorter than the capsule; seeds ovoid, with close opaque striations.....*esculentus*.

Bracteoles ovate-lanceolate, 4–6 or (at the time of flowering) 0:—

Lobes of leaves obtuse, narrowed at their base; upper flowers in terminal leafless racemes; stem with minute thorns; bracteoles 5–6, fugacious2. *ficulneus*.

Lobes of leaves acute (or in *H. Manihot* sometimes 0); bracteoles 4:—

Bracteoles persistent, distinct; nerves of leaves with a few appressed setae on both sides3. *Manihot*.

Bracteoles connate nearly to the top at the time of flowering or split down one side, fugacious:—

Nerves of leaves thickly beset with spreading setae

4. *setinervis*.

Nerves of leaves tomentose5. *angulosus*.

Calyx with 5 distinct teeth and persistent in flower; seeds glabrous or hairy:—

Stem and sepals with small thorns; sepals eglandular; bracteoles mostly forked or foliaceous at the tip; seeds glabrous:—

Stipules foliaceous, semisagittate6. *surattensis*.

Stipules linear or 07. *furcatus*.

Stem and sepals unarmed, or, if with a few small prickles, then calyx-teeth and midrib of leaves with a large gland below:—

Seeds with long cottony hairs; flowers never yellow:—

Leaves acute, serrate, usually over 2 in. long, with a large gland on the midrib beneath; flowers scarlet; calyx-lobes 4 or 5 times longer than their tube8. *hirtus*.

Leaves blunt, dentate, usually under 1 in. long; flowers white; calyx-lobes about twice as long as their tube.....9. *micranthus*.

Seeds exceeded in length by their frill of stiff spreading hairs; flowers red white or blue, never yellow :—

Flowers white, turning to red ; leaves orbicular in outline, palmately lobed.....*mutabilis*.

Flowers purplish blue ; leaves ovate from a cuneate base or 3-lobed and broader*syriacus*.

Seeds with short scattered bulbous-based hairs ; flowers crimson ; leaves lanceolate, serrate ; staminal tube much exserted

Rosa-sinensis.

Seeds densely velvety, with short stiff adpressed or spreading hairs ; flowers yellow :—

Tree with linear striate bracteoles longer than the calyx ; leaves subglabrous above.....10. *canescens*.

Herb ; bracteoles shorter than the calyx ; leaves densely pubescent above.....11. *panduraeformis*.

Seeds covered with setulose scales ; leaves with a large gland on the midrib beneath ; bracteoles adnate to the base of the calyx, becoming fleshy and purplish*Sabdariffa*.

Seeds glabrous, sometimes with scattered adnate scales :—

Seeds uniformly tubercled :—

Herb with wingless capsules.....12. *Solandra*.

Shrub with winged capsules13. *vitifolius*.

Seeds smooth or with a few small tubercles :—

Calyx clothed with close white tomentum and bearing at the base of each lobe a large gland ; leaves with a gland on the midrib below, palmatifid, or rarely without lobes ...*cannabinus*.

Calyx without white tomentum and eglandular :—

Leaves entire or serrulate, orbicular, often cordate ; bracteoles connate into a cup at the base ; tree14. *tiliaceus*.

Leaves more or less lobed or cut :—

Herbs or a little woody at the base :—

Leaves palmatifid, lobes pinnatifid ; calyx inflated, membranous15. *Trionum*.

Leaves with short pointed biserrulate lobes ; stem, peduncles and acuminate capsules clothed with rigid pungent hairs16. *lunariifolius*.

Shrubs or undershrubs ; leaves palmately lobed :—

Capsule depressed-globose, hispid ; leaf-margins sinuate

17. *platanifolius*.

Capsule oblong, acuminate ; leaf-margins entire

18. *Lampas*.

1. HIBISCUS ABELMOSCHUS, Linn. *H. rugosus*, Mast. ; F. B. I. i. 342. *Abelmoschus rugosus*, Wall. ; W. & A. 53.
Deccan and Carnatic, in hilly regions.
2. HIBISCUS FICULNEUS, Linn. ; F. B. I. i. 340. *Abelmoschus ficulneus*, W. & A. 53 ; Wt. Ic. t. 154.
Circars, Deccan and Carnatic, not common, sometimes on black cotton soil.
A spreading annual with thick rootstock, giving a good fibre.
3. HIBISCUS MANIHOT, Linn. ; F. B. I. i. 341. *H. tetraphyllus*, Roxb. ; F. B. I. i. 341.
W. Coast from S. Canara to Travancore.
A large erect annual up to 6 ft. high.
4. HIBISCUS SETINERVIS, Dunn in Kew Bull. 1914, 324. *Abelmoschus angulosus*, W. & A. 53 (partly).
W. Gháts in Mysore, Malabar and Nilgiris, at about 3,000 to 6,000 ft.
An erect perennial herb with handsome flowers.
5. HIBISCUS ANGULOSUS, Steud. ; F. B. I. i. 341 (partly) ; Wt. Ic. t. 951.
W. Gháts, in the higher ranges from S. Canara to Travancore, up to 8,000 ft., usually near streams.
An erect perennial herb with handsome flowers.
6. HIBISCUS SURATTENSIS, Linn. ; F. B. I. i. 334 ; Wt. Ic. t. 197 ; W. & A. 48.
W. Coast from S. Canara to Tinnevely.
A prickly trailing plant with many branches.
7. HIBISCUS FURCATUS, Roxb. ; F. B. I. i. 335 ; W. & A. 48.
Rumpa Hills in Godavari at 2,000 ft. ; W. Coast and W. Gháts from Malabar and Nilgiris to Travancore, up to 3,000 ft.
A prickly trailing undershrub.
8. HIBISCUS HIRTUS, Linn. ; F. B. I. i. 335 ; W. & A. 51 ; Wt. Ic. t. 41.
N. Circars in Godavari District.
9. HIBISCUS MICRANTHUS, Linn. f. ; F. B. I. i. 335 ; W. & A. 51.
Almost all Districts, common.
A slender branching undershrub.
10. HIBISCUS CANESCENS, Heyne ; F. B. I. i. 337 ; W. & A. 49.
Deccan and Carnatic, apparently scarce.

11. *HIBISCUS PANDURAEFORMIS*, Burm.; F. B. I. i. 338; W. & A. 50.
Deccan and Carnatic, not common.
A tall herbaceous undershrub.
12. *HIBISCUS SOLANDRA*, L'Hérit.; F. B. I. i. 336. *Lagunaea lobata*, Willd.; W. & A. 55.
N. Circars, in Vizagapatam and Godavari; W. Gháts and Coast from S. Canara to Tinnevely.
An erect annual herb.
13. *HIBISCUS VITIFOLIUS*, Linn.; F. B. I. i. 338; W. & A. 50.
All Districts, common, up to 3,000 ft. in the Deccan.
An annual or biennial herb with yellow flowers.
14. *HIBISCUS TILIACEUS*, Linn.; F. B. I. i. 343. *Paritium tiliaceum*, W. & A. 52; Wt. Ic. t. 7.
W. Coast Districts along backwaters and tidal rivers from S. Canara southwards; perhaps also E. Coast in the Deltas of the Godavari and other rivers though not recorded in Herbaria available.
A much-branched tree with handsome flowers and soft wood. Vern. *Tam.*, *Mal.* Nir paratthi.
15. *HIBISCUS TRIONUM*, Linn.; F. B. I. i. 334. *H. vesicarius*, Cav.; W. & A. 48.
Deccan, in Anantapur, Mysore, Coimbatore and N. Nilgiris, common on black cotton soil.
An annual spreading herb.
16. *HIBISCUS LUNARIIFOLIUS*, Willd.; F. B. I. i. 338; W. & A. 49; Wt. Ic. t. 6. *H. sidoides*, W. & A. 49.
E. Carnatic and W. Gháts from Mysore southwards, up to 3,000 ft.
A herbaceous erect perennial.
17. *HIBISCUS PLATANIFOLIUS*, Sweet. *H. collinus*, Roxb.; F. B. I. i. 338. *H. eriocarpus*, DC.; W. & A. 51.
N. Circars in Vizagapatam; Cuddapah forests; Salem, Tinnevely, sometimes cultivated in gardens.
A large shrub with handsome flowers. Vern. *Tel.* Kandagang.
18. *HIBISCUS LAMPAS*, Cav.; Wt. Ic. t. 5; W. & A. 48. *Thespesia Lampas*, Dalz. & Gibs.; F. B. I. i. 345.
N. Circars, Deccan and W. Gháts, in forest glades, up to 3,000 ft.

An undershrub up to 4 ft. high, with conspicuous yellow flowers. Vern. *Tel.* Kondapatli.

H. esculentus, L., is the "okra" or "bendekai" plant, commonly cultivated for its capsules, which are eaten as a vegetable. *H. Sabdariffa*, L., is the Roselle plant, cultivated for its fleshy enlarged red calyx, which is eaten in tarts or made into a jelly. *H. cannabinus*, L., is the Deccan hemp, cultivated for its valuable fibre. *H. mutabilis*, L., *H. syriacus*, L., *H. Rosa-sinensis*, L., and *H. radiatus*, L., are cultivated as garden plants.

10. Bombax, Linn.

Trees with buttressed trunks, clear of branches for a long distance from the ground. *Leaves* digitate; stipules small. *Flowers* out before the leaves appear, clustered towards the ends of the branchlets; bracteoles 0. *Calyx* leathery, cup-shaped, irregularly lobed. *Petals* 5, oblong obovate or linear. *Stamens* polyadelphous, very numerous; filaments often combined so that the cells appear to be 2 instead of 1. *Ovary* 5-celled; ovules numerous in each cell; style clavate, divided into 5 spreading stigmatic branches at the top. *Capsule* dehiscing by 5 leathery or woody deciduous valves. *Seeds* smooth, globose, imbedded in long white wool; albumen scanty; cotyledons crumpled.

Flowers about 3 in. long; stamens normally 80 in all, in 5 phalanges of 12 opposite the petals, with 10 thin ones behind and 5 large central double ones alternate with the petals, filaments flat; tree reaching 130 ft. in height; trunk with hard conical prickles; leaflets lanceolate, long-(about 1 in.) petioluled; capsule velvety.....1. *malabaricum*. Flowers 5-7 in. long; stamens about 600, in 5 phalanges opposite to the petals, filaments threadlike; trees reaching 40 ft. in height:—

Leaflets obovate, cuspidate, petiolules under .3 in. long; trunk unarmed; branchlets sometimes prickly; capsule glabrous

2. *insigne*.

Leaflets lanceolate, acuminate, sessile; trunk with prickles in clusters of 1-12; capsule velvety.....3. *scopulorum*.

1. BOMBAX MALABARICUM, DC.; F. B. I. i. 349: W. & A. 61; Wt. III. t. 29; Bedd. Fl. t. 82. *B. heptaphyllum*, Roxb. Cor. Pl. iii. t. 247.

In all forest Districts, occasionally in open country, often cultivated. The Red Cotton tree.

A very conspicuous tree, of gigantic size in favourable localities, flowering when bare of leaves in the hot season. The wood is soft and perishable, but is more durable under water, and is therefore in use for sea-going boats. It gives a gum and an exudation used in medicine. The cotton surrounding the seeds is used for stuffing pillows, but is not so good as that of *Eriodendron*. Vern. *Hind*. Simal; *Ur*. Buroh; *Tel*. Buraga; *Tam.*, *Mal*. Ilavu; *Mar*. Sayar; *Kan*. Burla, Sauri.

2. BOMBAX INSIGNE, Wall.; F. B. I. i. 349.

Anamalai Hills (Wight).

3. BOMBAX SCOPULORUM, Dunn. *B. insigne*, Bourd. Trees Trav. 45 (not of Wall.).

Travancore Hills, on rocks.

A small tree resembling *B. malabaricum*, but never attaining its size. Wood soft and white. Vern. *Tam.*, *Mal*. Kal ilavu, Parei ilavu.

11. *Eriodendron*, DC.

Trees; trunk prickly when young; branches whorled. *Leaves* digitate, deciduous; stipules small. *Flowers* tufted, in the axils of leaves or appearing before them; bracteoles 0. *Calyx* campanulate, 5-toothed. *Petals* oblanceolate. *Staminal tube* short, dividing into 5 filiform branches, each bearing at the top 2 or 3 sinuous anthers. *Ovary* 5-celled; ovules many in each cell; style dilated into a shortly 5-lobed stigma. *Fruit* an oblong coriaceous 5-valved capsule woolly within. *Seeds* black, globose, enveloped in silky cotton: cotyledons crumpled.

ERIODENDRON PENTANDRUM, Kurz. *Eriodendron anfractuosum*, DC.; F. B. I. i. 350; W. & A. 61; Wt. Ic. t. 400.

A tall tree with smooth green stem and horizontal branches; leaflets 5-8, 3-4 in. long, petiolules very short; flowers white or yellowish, 1.5-2 in. across; capsule cylindric, 4-5 in. long, green.

Not indigenous but naturalized on the W. Coast and often planted there and elsewhere.

The White Cotton tree, giving the "Kapok" cotton used for pillows and cushions, and of better quality than that of *Bombax*. Vern. *Tam*. Panji; *Mal*. Panya.

12. *Thespesia*, Soland.

Trees, clothed in the younger parts with peltate scales. *Leaves* entire. *Flowers* solitary, axillary. Bracteoles 5, fugacious or 0. *Calyx* truncate, entire. *Petals* 5, convolute. *Staminal tube* toothed at the top, clothed except at the swollen base with the free ends of the filaments. *Ovary* 5-celled; ovules 2-3 in each cell; styles club-shaped, 5-furrowed. *Fruit* fleshy, very tardily dehiscent. *Seeds* few, large, striate with lines of adpressed soft hairs.

THESPESIA POPULNEA, Cav.; F. B. I. i. 345; W. & A. 54; Wt. Ic. t. 8; Bedd. Fl. t. 63.

A fairly large evergreen tree with cordate entire long-petioled leaves 3-5 in. each way and long-peduncled flowers 2-3 in. across, the petals yellow fading to purplish pink.

W. Coast near the sea-shore, very common and perhaps wild in S. Canara and Malabar, doubtfully so in Travancore, as also in E. Coast Districts. Often planted in avenues near the coast, occasionally inland. The Indian Tulip or Portia tree.

Wood dark red, hard and durable. Vern. *Tam.* Puvarasam; *Tel.* Gangareni; *Mar.* Bhendi; *Kan.* Huvarasi; *Mal.* Porasu.

13. *Cullenia*.

Lofty trees covered in the younger parts with peltate scales. *Leaves* oblong-lanceolate, penninerved, exstipulate. *Flowers* fascicled on the old wood; bracteoles 3-5, connate into a cylindric tube. *Calyx* tubular, toothed. *Petals* 0. Anthers clustered at intervals on the 5 branches of the *staminal tube*. *Ovary* 5-celled; ovules 2, superposed in each cell; style elongate, woolly; stigma capitate. *Fruit* a large globose spiny ultimately 5-valved capsule, containing a few large arillate exalbuminous seeds.

CULLENIA EXCELSA, Wt. Ic. t. 1761-2; F. B. I. i. 350.

A tall buttressed tree with a long smooth white fluted trunk below the branches; leaves simple, entire, 3-6 in. long; flowers brownish white, 1.5 in. long; fruit about 5 in. across, very spinous.

W. Ghâts from Coorg southwards, up to 4,000 ft., in evergreen forests.

Wood pale brown, soft, not durable. Vern. *Tam.* Vedupla; *Mal.* Kar aini.

Modiola caroliniana, G. Don, is naturalized near Ootacamund.

Anoda hastata, Linn., is a blue-flowered herbaceous hispid introduced weed which has been found about Madras.

Malachra capitata, Linn., is a herbaceous weed occasionally found along the Carnatic coast. It is not indigenous and is recognized by the flowers in dense capitate heads.

Various races of *Gossypium arboreum*, *barbadense*, *herbaceum*, *hirsutum*, *Nanking*, *obtusifolium*, *purpurascens* constitute the cultivated cottons of the Presidency. For their identification and an account of them, reference should be made to Sir George Watt's "Commercial Products of India."

Adansonia digitata, Linn., the Baobab tree of Africa is found here and there in cultivation.

Family XXVII. STERCULIACEAE.

Herbs, shrubs or trees, the herbaceous parts usually clothed with stellate hairs. *Leaves* alternate, simple or digitate, entire toothed or lobed, usually stipulate. *Flowers* usually in axillary cymes, regular, 1- or 2-sexual. *Sepals* valvate, more or less combined below. *Petals* 5, hypogynous, free or connate at the base or 0. *Stamens* 5-many; filaments united into a tube or rarely free; anthers 1-5 together, on or between the teeth of or irregularly arranged in one or more whorls on the outside of the tube; cells 2, parallel or diverging, very rarely confluent; staminodes 5 or 10, co-ordinate with the stamens or 0. *Ovary* free, 4-5- (rarely 10-12-) celled or reduced to a single carpel; ovules 2-many (rarely 1) in each cell, attached to the inner angle; styles as many as the cells of the ovary, distinct or connate. *Fruit* often a 5-valved loculicidal capsule, woody, chartaceous or membranous, sometimes of 1-6 spreading or spirally twisted follicles, rarely dividing into cocci or baccate. *Seeds* sometimes arillate, occasionally winged; albumen fleshy, thin or 0; embryo straight or curved; cotyledons usually foliaceous.

Flowers unisexual; petals wanting:—

Leaves clothed beneath with peltate scales; fruit indehiscent

1. *Heritiera*.

Leaves without peltate scales; fruit follicular:—

Follicles woody or coriaceous:—

Seeds winged; follicles globose, large, woody; leaves cordate ovate, 7-nerved at the base.....2. *Pterygota*.

Seeds not winged ; follicles usually coriaceous and oblong, opening when mature ; leaves simple lobed or digitate.....3. **Sterculia.**

Follicles membranous, opening long before maturity ; leaves palmately lobed4. **Firmiana.**

Flowers bisexual ; petals present, often deciduous :—

Staminal tube adnate to the gynophore, forming a more or less elongated stalk :—

Fruit a membranous, inflated capsule ; trees with cordate 5-nerved leaves**Kleinhofia.**

Fruit of straight or spirally twisted follicles ; seeds not winged ; shrubs.....5. **Helicteres.**

Fruit a woody loculicidal 5-valved capsule ; seeds winged ; trees or shrubs, usually mealy5. **Pterospermum.**

Staminal tube distinct from the carpels and enclosing them :—

Staminal tube elongate, bearing the stamens on its outer surface in a cone ; no staminodes7. **Eriolaena.**

Staminal tube short, divided into 5 teeth bearing the anthers ; petals marcescent ; no staminodes :—

Styles or stigmas, cells of ovary and valves of fruit 5 each

8. **Melochia.**

Style or stigma and cell of ovary 1 each, capsule 2-valved, 1-seeded.....9. **Waltheria.**

Staminal tube short, bearing 5 or 10 staminodes with solitary or clustered anthers between them :—

Petals deciduous :—

Trees with 10-15 fertile anthers :—

Leaves scabrid or glabrous above, pubescent beneath ; anthers 15, in threes ; fruit muricate, many-seeded.....10. **Guazuma.**

Leaves glabrous on both sides ; anthers 10, single ; fruit rugose, seed 111. **Leptonychia.**

Climbing shrubs or herbs with 5 fertile anthers ; fruit bristly, 5-valved, valves 1-seeded.....12. **Buettneria.**

Petals persistent :—

Leaves ovate or lanceolate, obtuse ; bracteoles persistent ; anthers 513. **Melhania.**

Leaves tapering from the truncate base to the caudate tip ; bracteoles caducous ; anthers 15.....**Pentapetes.**

1. **Heritiera**, Ait.

Trees. *Leaves* simple, peltate-scaly beneath, penninerved or 3-nerved. *Flowers* small, 1- or 2-sexual, in axillary panicles. *Calyx* 5-toothed or 5-fid. *Petals* 0. *Staminal column* slender,

bearing in a ring beneath the apex 5-10 adnate anthers with parallel cells. *Carpels of ovary* 5-6, subdistinct, alternating at the base with pairs of staminodes; ovules 1-2 in each carpel; styles short; stigmas 5, thick. *Ripe carpels* woody, indehiscent, beaked or samaroid. *Seeds* exalbuminous; cotyledons thick, radicle next the hilum.

Leaves oblong, exceeding 5 in. long by 2 in. broad, main nerves 10 or more pairs; ripe carpels woody, keeled, with a thin narrow beak; coast tree1. *littoralis*.

Leaves lanceolate, less than 5 in. long by 2 in. broad, main nerves about 7 pairs; ripe carpels samaroid, the wing long membranous; tree of hill forests2. *Papilio*.

1. *HERITIERA LITTORALIS*, Dryand.; F. B. I. i. 363; W. & A. 63.

W. Coast at Cochin and perhaps elsewhere, perhaps also on E. Coast in Southern Districts.

Wood dark red, hard, heavy and tough.

2. *HERITIERA PAPILIO*, Bedd. Fl. t. 218; F. B. I. i. 363.

W. Gháts of Tinnevely and Travancore extending northwards to Nilgiris, at 2,000 to 4,000 ft.

Wood red, very hard and tough, used in Tinnevely for building, cart poles, and agricultural implements.

2. *Pterygota*, Endl.

Trees. *Leaves* undivided. *Flowers* in panicles from the axils of fallen leaves, 1-sexual or polygamous. *Calyx* deeply 5-partite. *Petals* 0. *Staminal column* cylindric bearing 4-5 phalanges of about 5 anthers each in ♂ flowers, and staminodes round the base of the ovary in ♀ flowers. *Ovary* of 5 sessile carpels; ovules numerous; styles short, recurved; stigma 2-lobed. *Fruit* of 5 large, globose or obovoid, follicles, hard and woody, opening when ripe only with 1 valve. *Seeds* about 40, furnished with an oblong-obovate wing attached to the margin of the valve; albumen adhering to the cotyledons; radicle small, superior.

PTERYGOTA ALATA, R. Br. *Sterculia alata*, Roxb. Cor. Pl. iii. t. 287; F. B. I. i. 360. *S. Haynii*, Bedd. Fl. t. 230.

A tall evergreen tree with ovate cordate large leaves, reddish-brown flowers and a hard woody fruit 5 in. in diam. Wood white, of good quality but little used. Vern. *Mal.* Kodathani, Anathondi.

W. Gháts, in evergreen forests from Malabar to Tinnevely up to 3,000 ft.; often planted elsewhere.

3. *Sterculia*, Linn.

Trees. *Leaves* undivided, lobed or digitate. *Flowers* in usually axillary panicles or racemes, 1-sexual or polygamous. *Calyx* 4-5-fid or -partite. *Petals* 0. *Staminal column* bearing 10-30 anthers at its apex. *Ovary* of 5 nearly distinct carpels; ovules 2-many in each carpel; styles connate below; stigmas radiating. *Ripe carpels* distinct, follicular, sessile or stalked, woody coriaceous or membranous. *Seeds* 1-many; albumen adhering to the cotyledons.

Leaves digitate with 7-9 leaflets; calyx dull orange-coloured, deeply 5-partite, glabrous outside, thickly villous within; follicles large, woody, scarlet1. *foetida*.

Leaves palmately lobed, velvety beneath; calyx-tube campanulate, about equal to the lobes; follicles coriaceous, villous:—

Calyx yellow, pubescent within; follicles red, covered with stinging bristles; leaves with 5 short caudate lobes2. *urens*.

Calyx pink, glabrous within; follicles bright red, rusty villous, covered with stellate non-stinging hairs; leaves with 5-7 long-acuminate lobes3. *villosa*.

Leaves undivided:—

Leaves palmately 7-ribbed, cordate, acuminate, glabrous; calyx-segments linear spathulate, free nearly to the base; follicles stalked, ventricose with a membranous wing4. *populnifolia*.

Leaves penninerved:—

Lower nerves rising acutely from the base of the leaf; petioles and reticulate nervules rusty-stellate-tomentose; calyx densely tomentose, segments erect, broadly ovate; follicles obovoid, red with black seeds5. *guttata*.

Lower nerves divaricate; petioles and blades glabrescent; calyx subglabrous, segments linear, connivent; follicles oblong with acuminate tip and rusty down, seeds black6. *Balanghas*.

1. *STERCULIA FOETIDA*, Linn.; F. B. I. i. 354; W. & A. 63; Wt. Ic. t. 181.

Forests of the W. Coast at low elevations, scarce; elsewhere planted.

A large deciduous tree with light wood of little or no value.

The flowers have a very offensive smell. Vern. *Tam.* Pinári.

2. *STERCULIA URENS*, Roxb. Cor. Pl. i. t. 24; F. B. I. i. 355; W. & A. 63.

Dry forests in most Districts, especially on dry rocky hills, and associated with *Boswellia*.

A large deciduous tree, very conspicuous from its pale smooth bark which peels off in flakes. Wood soft and used only for toys. Vern. *Hind.* Gular; *Tel.* Tabsu; *Tam.* Kávalam; *Mal.* Thondi.

3. *STERCULIA VILLOSA*, Roxb.; F. B. I. i. 355; W. & A. 63; Brand. For. Fl. t. 10.

N. Circars, in Ganjam forests; Deccan in Coimbatore; W. Ghát Districts, S. Canara to Travancore.

A large deciduous tree with soft perishable wood. The bark gives a strong coarse fibre used for elephant ropes. Vern. *Hind.* Udal; *Tam.* Muratthan; *Mal.* Vakka; *Kan.* Savaya.

4. *STERCULIA POPULNIFOLIA*, Roxb.; F. B. I. i. 361; W. & A. 62. Deccan Hills and E. Gháts, usually among rocks.

A small tree with scarlet flowers and inflated papery follicle. Vern. *Tel.* Delibuda.

5. *STERCULIA GUTTATA*, Roxb.; F. B. I. i. 355; W. & A. 62; Wt. Ic. t. 487; Bedd. Fl. t. 105.

Evergreen forests of W. Gháts up to 2,000 ft., very common; Sandur Hills in Bellary.

A moderate-sized evergreen tree with soft useless wood. Vern. *Tam.* Kávalam; *Mal.* Kithondi.

6. *STERCULIA BALANGHAS*, Linn.; F. B. I. i. 358; Wt. Ill. t. 30; W. & A. 62.

W. Gháts in Malabar, Travancore, and Tinnevely, scarce. A moderate-sized tree with soft wood. Vern. *Mal.* Kávalam.

4. *Firmiana*, Marsigli.

Trees. *Leaves* palmately lobed. *Flowers* in terminal panicles, brightly coloured. *Calyx* tubular, covered with stellate tomentum, lobes short. *Petals* 0. *Staminal column* slender, bearing about 30 sessile anthers. *Ovary* of 5 carpels; ovules 2 in each carpel; styles short, recurved; stigmas acute. *Fruit* of 5 stipitate membranous follicles, opening before maturity. *Seeds* usually 2, one

adhering to each margin of the open follicle, ovoid, smooth; embryo transverse, radicle inferior.

FIRMIANA COLORATA, R. Br. *Sterculia colorata*, Roxb. Cor. Pl. i. t. 25; F. B. I. i. 359; W. & A. 63.

A moderate-sized deciduous tree with conspicuous scarlet flowers, palmately lobed leaves and papery follicles.

N. Circars in Vizagapatam and Godavari; Deccan forests, here and there; W. Gháts forests from S. Canara to Travancore, but not common.

Wood soft and useless. Vern. *Hind.* Bodula; *Tel.* Karaka; *Mar.* Khowsey; *Mal.* Malam paratthi.

5. *Helicteres*, Linn.

Trees or shrubs, more or less stellately pubescent. *Leaves* entire or serrate. *Flowers* axillary solitary or fascicled. *Calyx* tubular, 5-toothed at the apex, teeth often unequal. *Petals* 5, equal or unequal, with long sometimes divided claws, usually zygomorphic. *Staminal column* elongated, adnate to the gynophore, 5-toothed or -lobed; anthers 5–10, in groups at the top of the column between the teeth; cells divergent superposed sometimes confluent. *Ovary* 5-lobed, 5-celled, at the top of the column; ovules many in each cell; styles 5, subulate, more or less united. *Follicles* spirally twisted or straight. *Seeds* tubercled; albumen scanty; cotyledons folded round the radicle.

HELICTERES ISORA, Linn.; F. B. I. i. 365; W. & A. 60; Wt. Ic. t. 180.

A large shrub with obovate obliquely cordate serrate leaves, scabrous above, pubescent beneath; flowers red, fading to lead colour, 1·5 in. across, followed by spirally twisted cylindric pubescent fruit.

Forests in all Districts, common in undergrowth.

A useful shrub, giving small fuel of value and a strong but coarse fibre from its bark.

Vern. *Hind.* Marorphal; *Ur.* Ovla; *Tam.* Kaiva.

6. *Pterospermum*, Schreb.

Trees or shrubs, scaly or stellately tomentose. *Leaves* coriaceous, often oblique, penninerved. *Flowers* often very long, on short axillary 1- or few-flowered peduncles; bracteoles 3, entire

laciniate pectinate fimbriate or 0. *Calyx* tubular, 5-fid or 5-partite, deciduous. *Petals* 5, deciduous. *Staminal column* adnate to the gynophore, bearing 5 groups of 3 stamens each between the staminodes. *Ovary* within the apex of the column, 5-celled; cells many-ovuled; style entire. *Capsule* woody or leathery, ovoid or oblong, terete or angled, loculicidally 5-valved. *Seeds* ascending, winged above; albumen thin or 0; cotyledons corrugated or folded.

Reticulation of leaves raised, conspicuous:—

Calyx 1-1.5 in. long:—

Bracteoles laciniate; capsule obtusely angled, 3 in. long, acute; cells 4-seeded1. *reticulatum*.

Bracteoles ovate or lanceolate, pectinate; capsule tuberculate, 2 in. long, furfuraceous; cells about 4-seeded2. *obtusifolium*.

Calyx 2-2.5 in. long; bracteoles ovate, pectinate; capsule obtusely 5-angled, 2 in. long; cells 8-10-seeded3. *Heyneanum*.

Calyx 4.5 in. long; capsule acutely 5-angled4. *diversifolium*.

Reticulation of leaves obscure:—

Leaves cordate at the base on one side, acute on the other; capsule subclavate acutely angled5. *rubiginosum*.

Leaves subequally rounded or subcordate at the base; capsule oblong, terete6. *suberifolium*.

1. *PTEROSPERMUM RETICULATUM*, W. & A. 69; F. B. I. i. 369.

Evergreen forests of Malabar and Travancore at low elevations, frequently planted on roadsides.

A handsome tree with reddish-brown hard wood. Vern.

Tam. Muli polavu; *Mal.* Mala vuram.

2. *PTEROSPERMUM OBTUSIFOLIUM*, Wight; F. B. I. i. 369.

Forests of Tinnevely and Travancore, apparently scarce.

3. *PTEROSPERMUM HEYNEANUM*, Wall.; F. B. I. i. 369; W. & A. 69; Wt. Ic. t. 489.

Forests of N. Circars and Deccan from Ganjam to Cuddapah and Chingleput.

A beautiful tree, resembling *P. acerifolium*, Willd., of N. India, but with smaller leaves. The young leaves and those of shoots are often much lobed. Wood light red, hard. Vern. *Tam.* Polavu; *Tel.* Tada.

4. *PTEROSPERMUM DIVERSIFOLIUM*, Bl.; F. B. I. i. 369. *P. glabrescens*, W. & A. 69; F. B. I. i. 369.

Forests of W. Ghâts at low elevations, not common.

A moderate-sized tree with horizontal branches. Wood reddish, soft. Vern. *Tam.* Vatta polavu; *Mal.* Pambaram.

5. *PTEROSPERMUM RUBIGINOSUM*, Heyne; F. B. I. i. 368; W. & A. 68; Bedd. Fl. t. 106.

Evergreen forests of the W. Ghâts, up to 3,000 ft., common in Wynaad, Anamalais and Tinnevely, less so in Travancore. A tall graceful tree, with a pink hard and close-grained wood, good but little known. Vern. *Tam.* Chittilei polavu; *Mal.* Malam thodali.

6. *PTEROSPERMUM SUBERIFOLIUM*, Lam.; F. B. I. i. 367; W. & A. 68.

Forests of N. Circars in Ganjam; Deccan in Mysore, Coimbatore, Cuddapah and N. Arcot, up to 3,000 feet; Striharikota forest on the Nellore Coast.

A moderate-sized pretty tree with light red wood, little used. Vern. *Ur.* Bailo; *Tel.* Lolagu; *Tam.* Tada.

7. *Eriolaena*, DC.

Trees. *Leaves* cordate, crenate or serrate, stellately pubescent or tomentose beneath. *Flowers* 1-many on axillary peduncles, rather large; bracteoles 3-5, multisect laciniate, sometimes small and caducous. *Calyx* 5-fid or 5-partite. *Petals* 5, deciduous, with dilated tomentose claws; blade flat, glabrous. *Staminal column* bearing many 1-anthered filaments; anthers erect, cells parallel. *Staminodes* 0. *Ovary* sessile, 5-10-celled; cells many-ovuled. *Style* with 5-10 stigmatic lobes at the apex. *Capsule* woody, loculicidally dehiscent. *Seeds* ascending, winged above; albumen thin; cotyledons folded or contortuplicate.

Leaves membranous, very white beneath, buds oblong, constricted at the middle: bracteoles very small, distant, multifid, caducous

1. *Lushingtonii*.

Leaves chartaceous or coriaceous; buds ovoid:—

- Bracteoles small, entire or lobed, caducous; stigma 5-lobed; capsule-valves not tubercled2. *quinquelocularis*.
Bracteoles large, much divided, persistent; stigma 8-10-lobed; capsule-valves tubercled3. *Hookeriana*.

1. *ERIOLAENA LUSHINGTONII*, Dunn in Kew Bull. 1915, 88.

Nallamalai Hills of Kurnool (A. W. Lushington).

2. *ERIOLAENA QUINQUELOCULARIS*, Wight under Wt. Ic. t. 882; F. B. I. i. 371; *Microchlaena quinquelocularis*, W. & A. 71.

Deccan, Sandúr Hills of Bellary, Hills of Coimbatore; W. Gháts from Mysore to Travancore at 2,000 to 4,000 ft., common.

A small tree with grey foliage.

3. *ERIOLAENA HOOKERIANA*, W. & A. 70; F. B. I. i. 70.

E. Gháts from Ganjam to Godavari; hill forests of the Deccan and Carnatic, up to 5,000 ft. in Cuddapah; W. Gháts, in the Pulney Hills.

A small tree with a light red, tough and strong wood. Vern. *Tel.* Nar botku.

8. *Melochia*, Linn.

Herbs, shrubs, or rarely trees, stellately pubescent. *Leaves* usually serrate. *Flowers* clustered, panicled or corymbose. *Calyx* 5-toothed or 5-fid, campanulate or inflated. *Petals* 5, spathulate or oblong, marcescent. *Stamens* 5, opposite the petals, connate at the base or beyond the middle. *Staminodes* minute or 0. *Ovary* sessile or shortly stalked with 5 2-ovuled cells; styles 5, free or united at the base. *Capsule* with 5 loculicidal valves. *Seeds* ascending, albuminous; embryo straight; cotyledons flat.

Herb with flowers in densely crowded terminal clusters...1. *corchorifolia*.
Small tree with flowers in umbellate corymbs2. *umbellata*.

1. *MELOCHIA CORCHORIFOLIA*, Linn.; F. B. I. i. 374. *Riedleia corchorifolia*, W. & A. 66.

A weed of roadsides and waste places, found in most Districts.

2. *MELOCHIA UMBELLATA*, Stapf in Kew Bull. 1913, 317. *M. velutina*, Bedd.; F. B. I. i. 374. *Visenia umbellata*, Wt. Ic. t. 509.

Coorg, near Mercara (Hohenacker), elsewhere cultivated in gardens and doubtfully indigenous.

9. *Waltheria*, Linn.

Herbs or undershrubs with stellate mixed with simple pubescence. *Leaves* simple, serrate; stipules narrow. *Flowers* small, in dense axillary or terminal clusters. *Sepals* 5, connate below in a tube. *Petals* 5. *Stamens* 5, connate below in a tube,

anther-cells parallel. *Ovary* sessile, 1-celled; ovules 2, ascending; style excentric; stigma club-shaped. *Fruit* a 2-valved, 1-seeded capsule. *Seed* ascending; albumen copious; embryo straight; cotyledons flat.

WALTHERIA INDICA, Linn.; F. B. I. i. 374; W. & A. 67.

An undershrub with much soft pubescence, ovate serrate leaves and small yellow flowers in globose axillary clusters. All Districts, common on roadsides, in waste places, and in forest undergrowth.

10. Guazuma, Plum.

A tree. Leaves simple, tomentose. *Flowers* in axillary cymes. *Sepals* 5, connate below. *Petals* 5, concave at the base, prolonged above into 2 narrow strap-shaped processes. *Stamens* 10, connate into a tube below, divided above into 5 3-anthered filaments alternating with 5 lanceolate staminodes. *Ovary* sessile, 5-lobed, 5-celled; styles more or less connate; ovules many in each cell. *Fruit* globular, woody, tubercled, many-seeded. *Seeds* albuminous, cotyledons folded.

GUAZUMA TOMENTOSA, Kunth.; F. B. I. i. 375; Wt. Ill. t. 31; W. & A. 64; Bedd. Fl. t. 107.

A small tree with obliquely cordate leaves and yellow flowers in large terminal and axillary panicles. Fruit 5-celled, resembling a small ripe mulberry in shape, size, and colour. An introduced tree, often found run wild, usually in the vicinity of towns and villages, indigenous in tropical America.

11. Leptonychia, Turcz.

Shrubs or trees. *Leaves* simple, entire. *Flowers* axillary, cymose. *Sepals* 5, valvate, distinct nearly to the base. *Petals* 5, valvate, short, orbicular, concave. *Staminal* tube short, bearing an outer series of 10–15 ligulate staminodes, a middle one of 10 fertile stamens and an inner one of 5 short fleshy staminodes. *Ovary* sessile, with 3–6 many-ovuled cells; style single, lobed at the top. *Capsule* (1–) 2–3-celled, dehiscing septically or loculicidally or both, or irregularly. *Seeds* black, with an orange-coloured fleshy aril.

LEPTONYCHIA MOACURROIDES, Bedd. Fl. t. 114 ; F. B. I. i. 379.

A small tree with lanceolate-caudate glabrous leaves and cymes shorter than the petioles ; capsule tubercled.

W. Gháts from the Carcoor Ghát in Wynaad, through Coimbatore, Tinnevely, and Travancore, up to 3,000 ft.

12. *Buettneria*, Linn.

Herbs, trees or shrubs, often climbing and frequently prickly. *Leaves* often glabrous. *Flowers* minute, in much-branched axillary or terminal cymes. *Sepals* 5, connate below. *Petals* 5, claws concave, limb with a long strap-shaped 2-fid appendage. *Stamens* 10, connate below, bearing 5 stamens alternating with 5 staminodes. *Ovary* sessile, with 5 2-ovuled cells ; style entire or 5-fid. *Capsule* globose, spiny, with 5 1-seeded cells and 5 septicidally deciduous valves. *Seeds* axile, exalbuminous ; cotyledons folded round the superior radicle.

BUETTNERIA HERBACEA, Roxb. Cor. Pl. i. t. 29 ; F. B. I. i. 376 ; W. & A. 65 ; Wt. Ic. t. 488.

A large unarmed herb with glabrous ovate acuminate dentate leaves and small flowers in short cymes followed by thinly bristly fruit.

N. Circars, Deccan and Carnatic, in forest undergrowth and shady places.

13. *Melhania*, Forsk.

Herbs, shrubs or undershrubs, with softly tomentose indumentum. *Leaves* simple, linear-oblong ovate or cordate, crenate or serrate. *Flowers* yellow, on 1-few-flowered axillary peduncles ; bracteoles narrow or cordate, often longer than the calyx. *Calyx* 5-partite. *Petals* 5, withering round the growing capsule. *Stamens* 10, of which 5 are sterile, connate below into a short cup ; staminodes ligulate, alternating with the perfect stamens. *Ovary* sessile, 5-celled ; ovules 1-many in each cell ; style short, rarely long, divided into 5 subulate spreading branches. *Capsule* loculicidally dehiscent. *Seeds* albuminous ; cotyledons plicate.

Leaves velvety above ; bracteoles lanceolate or ovate ; shrubs :—

Cymes equal to the petiole ; leaves oblong ; bracteoles lanceolate

1. *cannabina*.

Cymes twice as long as the petiole ; leaves roundish ovate ; bracteoles ovate 2. *Hamiltoniana*.
 Leaves glabrous above ; bracteoles linear ; undershrubs 3. *incana*.

1. MELHANIA CANNABINA, Wight ; F. B. I. i. 372.

S. Carnatic, in Tinnevely at Tuticorin (Wight).

2. MELHANIA HAMILTONIANA, Wall. ; F. B. I. i. 372. *M. abutiloides*, Arn. ; Wt. Ic. t. 23.

E. Coast, in Kistna and Guntur, on rocky hills.

3. MELHANIA INCANA, Heyne ; F. B. I. i. 372 ; W. & A. 68.

Deccan, in Cuddapah and Coimbatore, on red-soil lands.

Kleinhofia Hospita, L. is a showy tree often cultivated in gardens and avenues.

Pentapetes phoenicea, L., is a herbaceous annual with showy scarlet flowers, cultivated and occasionally found run wild, but not indigenous in S. India.

Theobroma Cacao, Linn., the Cacao tree, producing cocoa and chocolate, is sometimes cultivated in suitable places, as on the Malabar Coast and in Nilgiri valleys (e.g. Barliyar).

Family XXVIII. TILIACEAE.

Trees, shrubs or herbs, usually with mucilage sacs in the bark and leaves. *Leaves* usually alternate, simple or lobed ; stipules free, usually small and deciduous, rarely persistent or 0. *Flowers* regular, hermaphrodite or rarely 1-sexual, usually in terminal or axillary cymes. *Sepals* 3-5, free or united into a campanulate calyx, usually valvate. *Petals* 3-5 or 0, inserted round the base of the torus, contorted imbricate or valvate. *Stamens* usually indefinite, inserted on an elongated or short torus ; filaments free or rarely shortly connate at the base into a complete or 5-10-adelphous ring ; anther-cells 2, parallel, dehiscing by lateral clefts. *Ovary* free, sessile on the torus, 2-10-celled ; ovules 1-many, inserted on the inner angle of the cells ; style entire, divided or 0 ; stigmas terminal on the style or branches or sessile on the ovary. *Fruit* (1-) 2-10-celled, or by false septa many-celled ; baccate, or dry and dehiscing or separating into cocci. *Seeds* solitary and numerous in each cell ; testa usually coriaceous or crustaceous ; albumen usually copious ; cotyledons ovate or cordate.

Fruit a 6-winged 3-celled capsule ; tree with rather large ovate acuminate leaves and flowers in large terminal panicles **Berrya.**

Fruit a 2-4-parted or -lobed or entire unarmed drupe containing 1 or several pyrenes ; usually trees or erect shrubs..... **1. Grewia.**

Fruit a prickly or bristly capsule ; herbs or undershrubs

2. Triumfetta.

Fruit a siliquose or globose unarmed capsule ; annuals or prostrate perennials **3. Corchorus.**

1. *Grewia*, Linn.

Trees or erect straggling or climbing shrubs, usually stellately pubescent. *Leaves* 3-7-ribbed. *Flowers* usually yellow, in axillary, extra-axillary or terminal cymes, fascicles or panicles. *Sepals* 5, distinct. *Petals* 5, usually with a gland at the base within, generally shorter than the sepals, inserted round the base of the torus, very rarely 0. *Stamens* numerous, inserted on a short or elongated often glandular torus. *Ovary* of 2-4, 2-many-ovuled cells ; style subulate ; stigma short, 2-5-lobed or laciniate. *Fruit* 1-4-pyrened, entire or 2-4-lobed ; pyrenes 1- or 2-many-seeded and spuriously septate between the seeds. *Seeds* ascending or horizontal ; albumen copious, fleshy or rarely scanty ; cotyledons flat, foliaceous or fleshy.

Inflorescence paniculate ; fruit unlobed, pyriform ; leaves ovate- or obovate-lanceolate, acuminate ; trees (Subgenus i. **Microcos**)

1. Microcos.

Inflorescence not paniculate, axillary or extra-axillary (Subgenus ii. **Eugrewia**) :—

Peduncles 1-2-flowered, capillary, extra-axillary ; leaves roundish, glabrous or subglabrous ; fruit small, 2-parted, usually with 4 stones (Series 1. **POPULIFOLIAE**) **2. betulaefolia.**

Peduncles many-flowered :—

Leaves 3-ribbed, ovate to lanceolate ; flowering peduncles much longer than the petioles (except in *G. obtusa*, *G. orientalis*, and *G. Barberi*) :—

Leaves glabrous or with spreading pubescence or spreading tomentum :—

Fruit unlobed, depressed-globose, .6-1 in. across, velvety until old ; leaves very finely regularly crenate, glabrous or subglabrous or subscabrous (Series 2. **ALYSICARPAE**) :—

Peduncles shorter than the petioles ; leaves lanceolate ; fruit .8-1 in. across **3. obtusa.**

Peduncles longer than the petioles ; leaves oblong to ovate ; fruit .6-.7 in. across :—

Leaves ovate ; peduncles arcuate ; tomentum of fruit matted4. *rharnifolia*.

Leaves oblong ; peduncles straight ; tomentum of fruit spreading5. *Wightiana*.

Fruit slightly or deeply divided into 4 equal lobes ; gonophore manifest ; peduncles stout, extra-axillary, solitary or in pairs, never fascicled ; leaves often scabrous above, margins crenate or crenate-dentate (Series 3. COLUMNARES).

Lobes of fruit large, .4 in. long or more, distinct :—

Buds .25 in. across ; pedicels few together ; leaves densely pubescent beneath :—

Gonophore .25 in. long :—

Twigs and leaves beneath softly tomentose...6. *Gamblei*.

Twigs and leaves beneath harshly tomentose

7. *Lawsoniana*.

Gonophore .4 in. long ; leaves softly pubescent beneath

8. *heterotricha*.

Buds .12 in. across ; pedicels very numerous ; leaves subglabrous9. *umbellifera*.

Lobes of fruit small, .3 in. long or less, more or less united ; leaves ovate, obtuse, scabrous above :—

Peduncles equal to or not more than twice as long as the petioles ; leaves glabrous beneath ; fruit slightly 4-lobed, shortly bristly.....10. *orientalis*.

Peduncles 3-6 times longer than the petioles ; leaves with soft spreading tomentum beneath ; fruit deeply 4-lobed, covered at maturity with long soft hairs ...11. *emarginata*.

Fruit normally deeply divided into 2 oval or emarginate lobes ; leaves usually glabrous, apex sharply acuminate, margin sharply serrate (Section 4. SERRULATAE) :—

Peduncles usually 3 times longer than the petioles ; twigs usually glabrous ; leaves ovate-lanceolate12. *disperma*.

Peduncles about equal to the petioles ; twigs usually pubescent ; leaves linear- to ovate-lanceolate :—

Pedicels thickened upwards13. *Barberi*.

Pedicels capillary14. *lanceaefolia*.

Leaves finely densely appressed tomentose beneath (Section 5. BICOLORES) :—

Fruiting pedicels and peduncles long and slender ; fruit unlobed, pisiform ; leaf conspicuously serrate up to the acuminate tip

15. *Rothii*.

Fruiting pedicels and peduncles short and stout; fruit 2-parted; leaf very finely serrate up to the obtuse tip

16. *Damine*.

Leaves 5-ribbed, ovate or orbicular; peduncles axillary much longer than the petioles (or if, as in *G. tiliaefolia*, shorter, then stipules strongly sagittate); fruit didymous, bilobed or unlobed (Series 6. *TILIAEFOLIAE*):—

Peduncles shorter than the petioles; leaves and fruit usually glabrous at maturity; buds tomentose17. *tiliaefolia*.

Peduncles longer than the petioles:—

Leaves finely grey-tomentose beneath, minutely irregularly serrate; fruit tomentose, slightly 2-lobed18. *rotundifolia*.

Leaves pubescent beneath:—

Leaves obtuse or shortly acuminate; stipules auriculate; prostrate shrubs:—

Leaves cordate or truncate at the base, somewhat parallel-sided, finely regularly crenate; fruit unlobed, tomentose.....19. *subinaequalis*.

Leaves obtusely cuneate or rounded at the base, elliptic, irregularly coarsely crenate20. *sapida*.

Leaves caudate; stipules lanceolate; trees.....21. *pandaica*.

Leaves 3- or 5-ribbed; peduncles shorter or only slightly longer than the petioles:—

Leaves 5-ribbed, roundish:—

Leaves rounded at top, cordate, with raised concentric reticulation, velvety-pubescent below (Series 7. *GLOMERATAE*)

22. *villosa*.

Leaves usually irregularly lobed at the top, deeply bidentate, scabrous; fruit slightly 4-lobed (Series 8. *ASPERAE*)...23. *aspera*.

Leaves 3-5-ribbed, linear oblong:—

Buds oval; sepals 2-3 in. long; ovules less than 8 (Series 9. *HIRSUTAE*):—

Leaves 4-5-ribbed and a little oblique at the base; fruit slightly lobed, epicarp hairy until old, breaking away from the stones

24. *hirsuta*.

Leaves 3-ribbed, equal at the base; fruit distinctly lobed, at length glabrous25. *polygama*.

Buds cylindric; sepals 5-6 in. long; ovules 12-20; fruit slightly 1-4-lobed; pericarp stellately scabrous, breaking away from the fibrous interior (Series 10. *CARPINIFOLIAE*)26. *flavescens*.

1. *GREWIA MICROCOS*, L.; F. B. I. i. 392; W. & A. 81; Wt. Ill.

i. t. 33. *G. ulmifolia*, Roxb.; Wt. Ic. t. 84.

W. Gháts, from S. Canara and Mysore to Travancore and Tinnevelly.

An erect shrub, at once distinguished by its paniculate inflorescence and unlobed fruit; flowers white.

2. GREWIA BETULAEFOLIA, Juss. *G. populifolia*, Vahl; F. B. I. i. 385; W. & A. 80.

Deccan and Carnatic, common in hot dry localities.

A small much-branched shrub with small round leaves and yellowish edible fruit.

3. GREWIA OBTUSA, Wall. *G. bracteata*, W. & A. 76; F. B. I. i. 389 partly (*not of* Roth).

Deccan and Carnatic, from Kurnool to Madura, up to 4,000 ft.; E. slopes of Nilgiris, at 5,000 ft.

A shrub with lanceolate leaves, 3-4 in. long.

4. GREWIA RHAMNIFOLIA,¹ Heyne. *G. orientalis*, W. & A. 76; F. B. I. i. 384 (*not of* Linn.).

N. Circars and Carnatic Districts, extending to the E. Deccan.

A straggling or somewhat scandent shrub.

5. GREWIA WIGHTIANA, J. R. Drumm. *G. bracteata*, Mast. F. B. I. i. 389 (*not of* Roth).

Tinnevelly District, at Karyar (Barber).

6. GREWIA GAMBLEI, J. R. Drumm.

W. Gháts, in Nilgiris and Wynaad, at 3,000 to 6,000 ft.

7. GREWIA LAWSONIANA, J. R. Drumm.

W. Gháts, from Mysore through Malabar to Travancore.

8. GREWIA HETEROTRICHA, Mast. F. B. I. i. 385.

W. Gháts, in S. Canara, Coorg, Coimbatore and Nilgiris Districts, at 3,000 to 6,000 ft.

A climbing shrub.

9. GREWIA UMBELLIFERA, Bedd.; F. B. I. i. 393.

W. Gháts, in all the Districts.

10. GREWIA ORIENTALIS, Linn.; *G. columnaris* Sm.; F. B. I. i. 383; Wt. Ic. t. 44; W. & A. 76.

Carnatic, from Chingleput to Tinnevelly and lower Travancore.

A straggling shrub.

11. GREWIA EMARGINATA, W. & A. 79; F. B. I. i. 384.

W. Gháts, from Mysore southwards, on the eastern side.

A shrub with leaves woolly beneath.

12. GREWIA DISPERMA, Rottl. *G. laevigata*, Vahl; W. & A. 77; F. B. I. i. 389.

In all Districts, in scrub forests, hedgerows, etc.

A small or middle-sized tree with 1-2-lobed drupe, each lobe with 2 nuts.

13. GREWIA BARBERI, J. R. Drumm.

Deccan, in Mysore, Bellary and Coimbatore; W. Gháts, from S. Canara to N. and E. slopes of Nilgiris, up to 5,000 ft.

14. GREWIA LANCEAEFOLIA, Roxb. *G. diplocarpa*, Thw.; F. B. I. i. 390.

W. Gháts, from Coimbatore to Tinnevely and Travancore.

15. GREWIA ROTHII, DC. *G. excelsa*, Mast.; F. B. I. i. 385 (partly, not of Vahl).

N. Circars from Ganjam to Godavari; Deccan, in Kistna, Kurnool and Bellary.

16. GREWIA DAMINE, Gaertn. *G. salvifolia*, Heyne; F. B. I. i. 386 (partly).

N. Circars, in Vizagapatam; Deccan, Kistna to Bellary.

A shrub or small tree with small leaves, very grey-pubescent beneath.

17. GREWIA TILIAEFOLIA, Vahl; F. B. I. i. 386 (partly); W. & A. 80; Bedd. Fl. t. 108.

In all forest Districts, up to about 4,000 ft.

A medium-sized tree, usually with large leaves; wood brown, strong and flexible, used for shafts of carts, oars, and other implements. Vern. *Hind.* Phalsa, Dhamin; *Ur.* Dhamono; *Tel.* Charachi; *Tam.* Únú; *Mal.* Chádicha.

18. GREWIA ROTUNDIFOLIA, Juss.; W. & A. 80; Wt. Ic. t. 45. *G. orbiculata*, Rottl.; F. B. I. i. 386.

N. Circars in Vizagapatam and Kistna; Deccan in Kurnool and Cuddapah; Carnatic, in S. Arcot and Tinnevely.

A small tree with leaves very grey-tomentose beneath.

19. GREWIA SUBINAEQUALIS, DC. *G. asiatica*, Mast. F. B. I. i. 386 (partly).

N. Circars, in Vizagapatam, summit of Karaka Konda, 2,000 ft. (Barber).

A small shrub of forest grass-lands, behaving in similar fashion to *G. sapida*.

20. GREWIA SAPIDA, Roxb. ; F. B. I. i. 387.
N. Circars, in Ganjam.
A small shrub of forest grass-lands, usually burnt or dying down yearly and then sending up fresh shoots from a permanent root-stock.
21. GREWIA PANDAICA, J. R. Drumm.
Tinnevely District, at Kanni Katti (Barber).
A tree reaching 60 ft. in height and 14 in. in diam. of trunk.
22. GREWIA VILLOSA, Willd ; F. B. I. i. 388 ; W. & A. 79.
Deccan and Carnatic, dry forest scrub from the Kistna southwards.
A shrub with well-marked, 5-ribbed velvety leaves and crustaceous fruit.
23. GREWIA ASPERA, Roxb. *G. abutilifolia*, Mast. in F. B. I. i. 390.
N. Circars, Deccan and Carnatic, in hilly regions, and up to 3,000 ft.
A shrub with often large leaves.
24. GREWIA HIRSUTA, Vahl ; W. & A. 78 ; Wt. Ic. t. 76 ; F. B. I. i. 391.
N. Circars, Deccan and Carnatic, in all forest Districts.
A common forest undershrub with narrow leaves.
25. GREWIA POLYGAMA, Roxb. ; F. B. I. i. 391.
N. Circars, in Ganjam and Godavari.
A forest shrub or small tree.
26. GREWIA FLAVESCENS, Juss. *G. carpinifolia*, Mast. in F. B. I. i. 387 (not of Juss.). *G. pilosa*, W. & A. 78.
N. Circars, Deccan and Carnatic, in most forest Districts.
A small tree.

2. *Triumfetta*, Linn.

Herbs or undershrubs with stellate pubescence. *Leaves* serrate dentate or entire, sometimes 3-5-lobed. *Flowers* yellow, axillary or leaf-opposed, few or densely cymose. *Sepals* 5, distinct, frequently mucronate at the apex. *Petals* 5 (rarely 0), glandular, thickened or foveolate at the base, inserted round the base of the torus. *Stamens* indefinite or rarely 10, inserted on the glandular torus, free. *Ovary* 5-celled ; cells 2-ovuled ; style filiform ; stigma 2-5-toothed. *Capsule* globose or ovoid, echinate or setose,

indehiscent or separating into cocci. *Seeds* 1-2 in each cell, pendulous, albuminous; embryo straight; cotyledons flat, foliaceous.

Fruit including bristles 1 in. across, hirsute; leaves ovate-acuminate serrate, softly tomentose beneath; perennial herb1. *pilosa*.

Fruit including bristles .5 in. across, glabrous; leaves ovate-caudate, serrate, glabrous; annual herb.....2. *annua*.

Fruit including bristles .2-.25 in. across; pericarp tomentose:—

Fruit ovoid; bristles ciliate down one side; stamens 5-13; leaves subglabrous, irregularly bluntly dentate; lower ones ovate 3-lobed; annual herb3. *pentandra*.

Fruit globose; leaves tomentose beneath; herbaceous undershrubs:—

Lower leaves 3-5-lobed; bristles of fruit glabrous; stamens 8-15

4. *rhomboidea*.

Lower leaves orbicular; bristles of fruit puberulous; stamens 15-25

5. *rotundifolia*.

1. TRIUMFETTA PILOSA, Roth; F. B. I. i. 394; W. & A. 74.

In almost all Districts, up to 6,500 ft. in Nilgiris.

2. TRIUMFETTA ANNUA, Linn.; F. B. I. i. 396.

Deccan, in Godavari and Bellary; W. Gháts, in S. Canara and Coorg.

3. TRIUMFETTA PENTANDRA, A. Rich. *T. neglecta*, W. & A. 75; F. B. I. i. 396.

E. Coast in Guntur; Tinnevely.

4. TRIUMFETTA RHOMBOIDEA, Jacq.; F. B. I. i. 395. *T. angulata*, Lam.; W. & A. 74; Wt. Ic. t. 320.

In almost all Districts.

5. TRIUMFETTA ROTUNDIFOLIA, Lam.; F. B. I. i. 395; W. & A. 75.

In all Districts of the Circars, Deccan and Carnatic.

3. *Corchorus*, Linn.

Herbs or undershrubs. *Leaves* serrate, lower pair of teeth usually prolonged into hairs. *Flowers* small, yellow; peduncles very short, axillary or leaf-opposed, 1-few-flowered, bracteate. *Sepals* 4-5. *Petals* 4-5, naked at the base. *Stamens* numerous (or 8-10), inserted on a very short torus. *Ovary* 2-5-celled; ovules many in each cell; style short, the apex stigmatose. *Capsule* siliquiform and even, or subglobose and echinate or

muricate, loculicidally 2-5-valved, rarely transversely septate between the seeds. *Seeds* numerous, pendulous or horizontal, albuminous, embryo curved.

Woody prostrate undershrub; leaves roundish; capsule .5-1.2 in. long, glabrous, cylindric, 4-valved; beak entire1. *Antichorus*. Erect annuals or rarely becoming perennial and woody but then always with pubescent capsules; leaves ovate-lanceolate to oblong-lanceolate:—

Capsule elongated; valves thin:—

Capsule ending in 3 radiating points, 3-4-valved, 1-1.5 in. long:—

Capsule 6-angled, 3-winged; leaves straight-sided, serrate

2. *acutangulus*.

Capsule cylindric, not winged; leaves ovate, crenate-serrate

3. *tridens*.

Capsule ending in a single beak, lobed at the summit:—

Capsule .5 in. long, cylindric, pubescent, 3-valved; leaves straight-sided, serrate4. *fascicularis*.

Capsule 1-3 in. long, ribbed or angled, glabrous or scabrid:—

Capsule 10-ribbed, 5-valved, glabrous; leaves ovate-lanceolate, finely crenate serrate5. *olitorius*.

Capsule 3-4-angled, 3-4-valved, more or less pubescent:—

Capsule 1.5-3 in. long; leaves straight-sided, crenate serrate

6. *trilocularis*.

Capsule under 1 in. long; leaves ovate, serrate

7. *urticaefolius*.

Capsule depressed globose, ridged and muricate, 5-valved; valves woody; leaves straight-sided, serrate8. *capsularis*.

1. CORCHORUS ANTICHORUS, Raeusch.; F. B. I. i. 398. *C. humilis*, Munro; Wt. Ic. t. 1073.

Deccan red soils, Cuddapah District.

2. CORCHORUS ACUTANGULUS, Lam.; F. B. I. i. 398; W. & A. 73; Wt. Ic. t. 739.

Pastures and cultivated land by the sides of ditches in most Districts of the Deccan, Carnatic and W. Coast.

3. CORCHORUS TRIDENS, Linn.; F. B. I. i. 398; W. & A. 73.

Dry Districts of the Deccan and Carnatic, on roadsides and waste lands.

4. CORCHORUS FASCICULARIS, Lam.; F. B. I. i. 398; W. & A. 72.

Most Districts of the Circars and Carnatic from Godavari to Tanjore.

5. *CORCHORUS OLITORIUS*, Linn.; F. B. I. i. 397; W. & A. 73.

Found run wild in many Districts, but probably not indigenous in S. India. Jute.

6. *CORCHORUS TRILOCULARIS*, Linn.; F. B. I. i. 397; W. & A. 72.

Dry Districts of the Deccan and Carnatic, a weed of waste places, roadsides, etc.

7. *CORCHORUS URTICAEFOLIUS*, W. & A. 73; F. B. I. i. 397.

Dry Districts of the Carnatic, Salem, Chingleput.

8. *CORCHORUS CAPSULARIS*, Linn.; F. B. I. i. 397; W. & A. 73;

Wt. Ic. t. 311.

Found run wild occasionally, but not indigenous, less common than *C. olitorius*. Jute.

Berrya Ammonilla, Roxb.; F. B. I. i. 383; W. & A. 86; Bedd. Fl. t. 58 is the Trincomali wood tree of Ceylon, frequently cultivated in Madras and elsewhere, but not yet found wild in S. India.

Family XXIX. ELAEOCARPACEAE.

Trees or shrubs without mucilage sacs. *Leaves* entire, alternate or verticillate; stipules present, persistent or caducous. *Flowers* usually hermaphrodite, in axillary racemes, regular. *Sepals* 4-6, valvate. *Petals* 4-6, free, valvate, laciniate or rarely entire, inserted outside the disk. *Stamens* indefinite, inserted on the cushion-like disk; anthers linear, opening by terminal pores. *Ovary* sessile, 2-5-celled, ovules 2 or more in each cell, usually pendulous; style columnar. *Fruit* a drupe with a bony usually 3-5- sometimes 1-celled stone. *Seeds* pendulous, 1 to each cell, albumen fleshy, cotyledons flat.

Elaeocarpus, Linn.

Trees. *Leaves* simple, usually crenate or serrate, sometimes entire. *Flowers* hermaphrodite, rarely polygamous, in axillary or lateral racemes. *Sepals* 4-5, valvate (rarely imbricate), distinct. *Petals* 4-5, laciniate lobed or rarely entire, inserted round the base of a thickened glandular disk. *Stamens* numerous, rarely 8-12, inserted between the glands on the disk; anthers linear, dehiscing by a transverse valve at the top. *Ovary* 2-5-celled; ovules 2 in each cell; style subulate, entire. *Drupe* with a single bony tuberculate stone divided into 1-5 1-seeded cells. *Seeds* pendulous; testa hard; albumen fleshy; cotyledons broad.

Flowers small; sepals under .3 in. long; anthers not awned; ovary 3-celled:—

Anthers more or less ciliate on the longer valve:—

Leaves elliptic or elliptic-obovate, chartaceous, glabrous above, slightly pubescent beneath, crenate-serrate, 2-4 in. long, petiole .5-1 in. long1. *serratus*.

Leaves lanceolate, acuminate, chartaceous, glabrous, glandular beneath, much narrowed at base, serrulate, 3-6 in. long, petiole 5 in. long.....2. *lanceaefolius*.

Leaves ovate-lanceolate, acuminate, subcoriaceous, glabrous, obtuse at base, mucronulate-serrate, 4-6 in. long, petiole 1 in. long

2. *lucidus*.

Anthers not ciliate on the longer valve; leaves broadly elliptic, coriaceous, glabrous, glandular beneath, serrate, 4-6 in. long, petiole about 1 in. long4. *oblongus*.

Flowers medium-sized; sepals .3-.7 in. long; anthers awned with a long bristle; ovary 2-3-celled:—

Sepals ordinarily .4 in. long; leaves chartaceous, ovate or ovate-lanceolate, bluntly long-acuminate at apex, rounded at base, glabrous, 2-4 in. long; petiole slender .75-1.25 in. long; drupe shining, .5 in. long5. *Munroii*.

Sepals ordinarily .5 in. long; leaves coriaceous, the 2 halves bent back so as to be boat-shaped, acute at apex, densely softly ferrugineous-pubescent beneath, 3-5 in. long; petiole stout, about 1 in. long; drupe shining, .7 in. long6. *ferrugineus*.

Sepals ordinarily .6 in. long; leaves subcoriaceous, flat, obovate, obtuse at apex, base rounded, ferrugineous-pubescent beneath, especially on the midrib and nerves, 4-8 in. long; petiole stout, .5-2 in. long; drupe smooth, 1.5-2 in. long7. *tuberculatus*.

Flowers large; sepals .7-1 in. long; anthers mucronate; ovary 2-celled; leaves coriaceous, elliptic or obovate, glandular beneath, glabrous, 3-4.5 in. long; petiole .5-.75 in. long; drupe 2 in. long

8. *venustus*.

1. ELAEOCARPUS SERRATUS, Linn.; F. B. I. i. 401; W. & A. 82. *E. cuneatus*, Wt. Ill. i. 83; F. B. I. i. 402.

W. Gháts, in all Districts, in evergreen forests up to 5,000 ft.

A rather small tree with greyish-white wood and edible fruit. Vern. *Tam.* Ulang Karei; *Mal.* Nalla kara, Valiya kara.

2. ELAEOCARPUS LANCEAEFOLIUS, Roxb.; F. B. I. i. 402; Wt. Ic. t. 65.

E. Gháts, in the Madgol Hills of Vizagapatam, 3,000 ft. (A. W. Lushington).

A large tree with a soft light brown wood.

3. *ELAEOCARPUS LUCIDUS*, Roxb. ; F. B. I. i. 403.

E. Gháts, in the Madgol Hills of Vizagapatam, 3,000 ft. (A. W. Lushington).

4. *ELAEOCARPUS OBLONGUS*, Gaertn. ; W. & A. 82 ; F. B. I. i. 403 ; Wt. Ic. t. 46.

W. Gháts, in all Districts, in evergreen forests up to 6,000 ft. ; common in Nilgiri Sholas.

A large tree with whitish wood. The leaves turn red when old. Vern. *Tam.* Bikki ; *Mal.* Katta kara.

5. *ELAEOCARPUS MUNROII*, Mast. in F. B. I. i. 407. *Monocera Munroii*, Wt. Ill. i. 84 ; Ic. t. 952.

W. Gháts, in all Districts from 2,500 to 6,000 ft. ; common in Nilgiri Sholas.

A large tree with white or brown moderately hard wood.

A very pretty tree and easily recognized. In young plants and coppice shoots the leaves are often linear-lanceolate.

Vern. *Tam.* Narebikki ; *Mal.* Pungári.

6. *ELAEOCARPUS FERRUGINEUS*, Wight ; F. B. I. i. 406 ; Bedd. Fl. t. 112. *Monocera ferruginea*, Wt. Ic. t. 205.

W. Gháts, in the Nilgiris, Anamalais, Pulneys, and the higher hills of Travancore at 6,000 to 7,000 ft.

The characteristic of the curiously folded-back leaves makes this interesting tree easily recognizable.

7. *ELAEOCARPUS TUBERCULATUS*, Roxb. ; F. B. I. i. 404 ; Bedd. Fl. t. 113. *Monocera tuberculata*, W. & A. 83 ; Wt. Ic. t. 62 ; Wt. Ill. i. t. 35.

W. Gháts, in all Districts up to 5,000 ft., on river banks and in evergreen forests.

A large tree with grey and white mottled bark and brown wood streaked with darker colour. The rugose seeds are used to make necklace beads. Vern. *Tam.* Rutthracham ; *Mal.* Piláhi, Naggara.

8. *ELAEOCARPUS VENUSTUS*, Bedd. Fl. t. 174. *Elaeocarpus Monocera*, Mast. in F. B. I. i. 405 (*not of Cav.*).

W. Gháts, in South Travancore at 3,500 to 4,500 ft.

A large handsome tree, very ornamental with its white flowers, but scarce and little known. The leaves have large glands in the axils of the nerves beneath.

Family XXX. LINACEAE.

Herbs, shrubs or rarely trees. *Leaves* alternate, simple, usually entire ; stipules lateral, intrapetiolar or 0. *Flowers* regular, bisexual, often 2- or more-morphic. *Sepals* 5 (or 4), free or connate at the base, imbricate. *Petals* 5 (or 4), hypogynous (or slightly perigynous), imbricate, often contorted, usually fugacious. *Stamens* 1-2 (-3)-times as many as the petals, with occasionally interposed staminodes, united at the base into a ring or short tube ; filaments usually filiform, inserted on or near the apex of the tube ; anthers versatile. *Disk* 0 or of 5 entire or didymous glands, adnate to the staminal tube. *Ovary* free, entire, 3-5-celled ; ovules 1-2 in each cell, pendulous ; styles 3-5, free or connate ; stigmas usually terminal. *Fruit* a septicidal capsule, splitting into as many valves as or by false dissepiments into twice as many as the cells of the ovary, or a drupe. *Seeds* with fleshy or no albumen.

Erect annuals1. **Linum.**

Shrubs or trees :—

Shrubs climbing by spiral hooks or straggling ; twigs tomentose ; petals imbricate ; drupe globose2. **Hugonia.**

Erect shrubs or trees ; twigs glabrous ; petals contorted :—

Stipules minute, subulate ; flowers over 1 in. across ; capsule globose, many-seeded.....3. **Reinwardtia.**

Stipules short, intrapetiolar, semi-amplexicaul ; flowers 3 in. across ; drupe oblong, 1-seeded4. **Erythroxylon.**

1. Linum, Linn.

Herbs or rarely undershrubs. *Leaves* alternate, narrow, entire : stipules 0 or glanduliform. *Sepals* 5, entire. *Petals* 5, contorted, fugacious. *Stamens* 5, connate at the base, often alternating with minute staminodes ; glands 5, small, adnate to the outside of the staminal tube. *Ovary* 5-celled, cells imperfectly septate, 2-seeded, or by false dissepiments completely divided each into 2 1-seeded cells. *Seeds* compressed ; albumen small.

LINUM MYSORENSE, Heyne ; F. B. I. i. 411 ; W. & A. 134.

A slender erect annual with small yellow flowers and short linear leaves.

Hilly regions in the Deccan and W. Gháts at high elevations.

Linum usitatissimum, L., the Flax Plant, is often cultivated for

its oil-seeds. It has large blue flowers, and is occasionally found run wild.

2. *Hugonia*, Linn.

Scandent or straggling herbs. *Leaves* stipulate. *Flowers* yellow, the lowest 2 peduncles of each branch often turned into spiral hooks. *Sepals* 5. *Petals* 5, contorted, fugacious. *Stamens* 10, connate into a short tube at the base, and there marked by 5 glandular swellings. *Ovary* 5-celled with 2 collateral ovules in each cell; styles 5, filiform. *Drupe* globose, fleshy. *Seeds* compressed, albuminous; cotyledons flat.

HUGONIA MYSTAX, Linn.; F. B. I. i. 413; W. & A. 72; Wt. Ill. i. 79, t. 32.

A rambling or climbing shrub with tomentose twigs, elliptic-obovate glabrous leaves, and large yellow flowers, usually many together at the ends of the branches.

In almost all Districts in dry forests.

Bark yellowish, corky. Wood hard and close-grained. Vern. *Tam*. Motira kanni.

3. *Reinwardtia*, Dumort.

Undershrubs. *Leaves* membranous, usually serrate; stipules minute caducous. *Flowers* large, yellow or white, in short axillary racemes or in terminal corymbs; pedicels bracteate. *Sepals* 5. *Petals* 5, contorted, fugacious. *Stamens* 5, connate at the base, alternating with setiform staminodes. *Glands* 2-3, adnate to the staminal tube. *Ovary* of 3-5 2-locellate cells; ovule 1 in each locellus; styles 3-4 (-7), filiform. *Capsule* globose, 6-8-valved. *Seeds* reniform; albumen thin.

REINWARDTIA TRIGYNA, Planch.; F. B. I. i. 412. *R. tetragyna*, Planch.; F. B. I. i. 412. *Linum trigynum*, Roxb.; W. & A. 134.

A small shrub with elliptic-lanceolate acute glabrous leaves and handsome yellow flowers, with many sexual forms combining styles and stamens of varying number and length. W. Ghát forests of S. Canara and Mysore.

4. *Erythroxylon*, Linn.

Shrubs or trees, usually glabrous. *Leaves* alternate, entire, often nearly distichous; stipules intrapetiolar, on the arrested shoots imbricating. *Flowers* axillary, small, whitish, solitary or fascicled. *Sepals* 5-6. *Petals* 5-6, with an erect double ligule

on the inner side. *Stamens* 10-12, monadelphous. *Ovary* 3-4-celled; styles 3-4, united into a style with capitate stigmas; ovules 1-2 in each cell. *Drupe* 1-celled, 1-seeded. *Seed* with a thin testa, and little or no albumen.

- Leaves obovate, obtuse, under 2 in. long1. *monogynum*.
 Leaves linear-elliptic, chartaceous2. *lanceolatum*.
 Leaves lanceolate, caudate-acuminate, membranous 3. *acuminatum*.
 Leaves ovate, obtusely acuminate, coriaceous4. *obtusifolium*.

1. ERYTHROXYLON MONOGYNUM, Roxb. Cor. Pl. i. t. 88; F. B. I. i. 414. *E. indicum*, Bedd. Fl. t. 81. *Sethia indica*, DC.; W. & A. 106; Wt. Ill. t. 48.

N. Circars, Deccan and Carnatic, in dry evergreen forests; W. Gháts, in dry hill forests of Travancore, up to 3,000 ft. A small tree with a dark brown rough bark and very hard reddish-brown wood, useful for turning and a good fuel. Vern. *Tam.* Devadara; *Tel.* Adivi gerenta; *Kan.* Devadaram.

2. ERYTHROXYLON LANCEOLATUM, Hook. f.; F. B. I. i. 415. *Sethia lanceolata*, Wt. Ill. i. 136. *S. erythroxyloides*, Wt. Ill. i. 136.

W. Gháts, in the Hills of Tinnevely, at Courtallum (Wight).

3. ERYTHROXYLON ACUMINATUM, Walp. *E. lucidum*, Moon; F. B. I. i. 415. *Sethia acuminata*, Arn.; Wt. Ill. i. 135.

W. Gháts, in Wynaad (Beddome) and Pulney Hills (Bourne).

4. ERYTHROXYLON OBTUSIFOLIUM, Hook. f.; F. B. I. i. 415. *Sethia lanceolata*, var. *obtusifolia*, Wt. Ill. i. 136.

W. Gháts, S. Canara to Nilgiris, up to 4,000 ft., scarce.

Family XXXI. MALPIGHIACEAE.

Trees or erect or climbing shrubs. *Leaves* usually opposite and entire, often provided with glands on the petiole, on the base of the blade and on the margin; stipules small or 0. *Flowers* bisexual, often irregular; pedicels jointed, bracteate. *Sepals* usually 5, imbricate, one or more usually furnished with large glands. *Petals* 5, usually equal, fimbriate or dentate, often clawed. *Disk* small. *Stamens* usually 10, 1 or more sometimes much longer than the others; filaments free or connate at the base. *Ovary* of 3 1-ovuled cells; styles 1-3. *Fruit* of 1 or more winged samaras, rarely a drupe. *Seeds* exalbuminous, embryo straight or curved, cotyledons often unequal, radicle superior.

Calyceine gland single, large; styles 1-2; samaras terminated by 1-3 lanceolate wings1. **Hiptage**.
 Calyceine glands 0; styles 3; samaras surrounded by an orbicular or lanceolate wing2. **Aspidopterys**.

1. **Hiptage**, Gaertn.

Climbing shrubs or rarely small trees. *Leaves* opposite, coriaceous, entire, eglandular, exstipulate. *Racemes* terminal and axillary; peduncles bracteate articulated with the 2-bracteate pedicels. *Flowers* with 4 white, one coloured petal, fragrant. *Calyx* 5-partite with one large gland partly on the pedicel. *Petals* clawed, unequal, silky. *Stamens* 10, declinate, one much longer than the others; filaments connate at the base. *Ovary* 3-lobed; styles 1-2, at first circinate; stigma capitate. *Fruit* of 1-3 2-3-winged samaras. *Seeds* globose, cotyledons unequal.

Leaves 4-9 in. long; flowers .7-1 in. across; wings of samaras about 1.5 in. long1. *Madablota*.

Leaves about 3 in. long; flowers .5 in. across; wings of samaras about 1 in. long.....2. *parvifolia*.

1. HIPTAGE MADABLOTA, Gaertn. ; F. B. I. i. 418; W. & A. 107.

Gaertnera racemosa, Roxb. Cor. Pl. i. t. 18.

N. Circars, Deccan and Carnatic, chiefly in ravines in hill forests, up to 6,000 ft.

A large straggling climbing shrub with pretty flowers and rough reddish wood. Vern. *Ur*. Boromali.

2. HIPTAGE PARVIFOLIA, W. & A. 107; F. B. I. i. 419.

W. Deccan, from Mysore, Tinnevely and S. Travancore.

A climbing shrub, smaller than *H. Madablota*.

2. **Aspidopterys**, A. Juss.

Climbing shrubs. *Leaves* entire, eglandular, exstipulate. *Flowers* paniced or fascicled; peduncles bracteate; pedicels slender. *Sepals* 5, short, eglandular. *Petals* 5, clawed, entire, white or yellow, inodorous. *Stamens* 10; filaments free or connate at the base; anthers ovate. *Ovary* 3-lobed; styles 3. *Fruit* of 1-3 samaras surrounded by a shield-like membranous wing. *Seeds* oblong; cotyledons straight, equal.

Leaves orbicular, suddenly acuminate, deeply cordate, white tomentose beneath; samara wings oval1. *cordata*.

Leaves ovate to lanceolate, acute to subcordate at the base, subglabrous beneath :—

Flowers in large panicles; samara wings elliptic.....2. *Roxburghiana*.
Flowers in axillary fascicles; samara wings orbicular ...3. *canarensis*.

1. *ASPIDOPTERYS CORDATA*, A. Juss.; F. B. I. i. 421.

Deccan, in Kurnool, Bellary and Mysore.

2. *ASPIDOPTERYS ROXBURGHIANA*, A. Juss.; F. B. I. i. 420.

Triopteris indica, Roxb. Cor. Pl. ii. t. 160.

N. Circars, in hill country; Deccan, Nallamalai Hills of Kurnool, Sandúr Hills of Bellary, etc.

3. *ASPIDOPTERYS CANARENSIS*, Dalz.; F. B. I. i. 420. *A. glomerata*, Wt. Ic. t. 1986.

Deccan, in Mysore; W. Gháts, Malabar to Tinnevely.

Family XXXII. ZYGOPHYLLACEAE.

Herbs or shrubs or rarely trees. *Leaves* opposite or (by the suppression of one of the pair) alternate, stipulate, 2-3-foliolate or pinnate; leaflets entire; stipules persistent, sometimes spiny. *Flowers* 1 or 2 together in the axils of the stipules, bisexual, regular or irregular. *Sepals* 5 (or 4), usually free and imbricate. *Petals* 5 (or 4 or 0), hypogynous, free, imbricated or contorted or rarely valvate. *Disk* usually convex or depressed, eglandular. *Stamens* as many as the petals, or twice (or thrice) as many, inserted at the base of the disk; filaments usually bearing a scale at or below the middle; anthers versatile. *Ovary* usually sessile, furrowed angled or winged, (2-) 4-5 (-12)-celled; ovules 1-2 or more in each cell; style simple, terminal. *Fruit* dividing into 2-10 cocci or capsular and septicidally dehiscent. *Seeds* usually 1 in each cell; albumen scanty or 0.

Prostrate silky herbs with pinnate leaves, yellow flowers and prickly fruit.....1. *Tribulus*

Erect prickly woody herbs with 1-3-foliolate leaves, pink flowers and unarmed fruit2. *Fagonia*.

1. *Tribulus*, Linn.

Prostrate herbs. *Leaves* stipulate, opposite or sometimes alternate, abruptly pinnate. *Flowers* solitary, pseudo-axillary, white or yellow. *Sepals* 5, imbricate. *Petals* 5, spreading, imbricate, fugacious. *Disk* annular, 10-lobed. *Stamens* 10 (or 5);

filaments bare. *Ovary* sessile, hirsute, 5-12-lobed, 5-12-celled; ovules 1-5 in each cell; stigmas 5-12. *Fruit* 5-angled, of 5-12 winged spinous or tuberculate cocci. *Embryo* exalbuminous.

TRIBULUS TERRESTRIS, Linn.; F. B. I. i. 423; W. & A. 145; Wt. Ic. t. 98.

A procumbent herb; leaflets 6-12, .2-.5 in. long, oblong, silky; flowers solitary, axillary, .5-1 in. across; fruit of 5 woody cocci, each provided with 2 long hard sharp divaricate spines.

Deccan, in hot dry localities chiefly.

2. *Fagonia*, Linn.

Erect or prostrate branching herbs, woody at the base. *Leaves* opposite, 1-3-foliolate; leaflets entire; stipules often spiny. *Flowers* solitary, pseudo-axillary. *Sepals* 5, deciduous, imbricate. *Petals* 5, clawed, caducous, imbricate. *Disk* small. *Stamens* 10, on the disk; filaments bare. *Ovary* sessile, 5-angled, of 5 2-ovuled cells, narrowed into a subulate style; stigma simple. *Fruit* of 5 1-seeded dehiscent cocci. *Seeds* compressed; albumen horny; cotyledons broad.

FAGONIA ARABICA, Linn.; F. B. I. i. 425. *F. mysorensis*, Roth; W. & A. 145; Wt. Ill. i. t. 64.

A small branched woody plant, the small pink flowers and globular capsules immersed in the copious thin straight spines.

Deccan, in dry localities in Kurnool, Anantapur, etc., often on black cotton soil.

Family XXXIII. GERANIACEAE.

Herbs, shrubs or rarely trees. *Leaves* opposite or alternate, usually 2-stipulate. *Flowers* bisexual, regular or irregular, solitary fascicled umbelled cymose or racemose; peduncles usually axillary. *Sepals* usually 5 and imbricate, posticous sometimes spurred. *Petals* 5 or fewer or 0. *Torus* raised in the centre. *Disk* of 5 glands or 0. *Stamens* 4-5 or 10 (or 15); anthers versatile. *Ovary* (2-) 3-5 lobed, 3-5-celled, prolonged above into a beak bearing capitate or linear stigmas or into sessile stigmas; ovules 1-2-many in each cell. *Fruit* a 3-5-lobed capsule or a berry, lobes 1-seeded and separating from the axis or many-seeded. *Seeds* usually with little or no albumen.

Flowers regular ; sepals herbaceous, not spurred, imbricate ; stamens 10 ; leaves simple and palminerved or compound :—

Leaves simple, palminerved ; glands on the torus 5, alternating with the petals ; capsules beaked, the valves when dehiscing rolled elastically upwards.....1. **Geranium.**

Leaves compound ; glands on the torus 6 ; capsules not beaked :—

Herbs ; fruit capsular :—

Leaves 3-foliolate ; capsule valves cohering with the axis

2. **Oxalis.**

Leaves abruptly pinnate ; capsule valves detaching from the axis

3. **Biophytum.**

Trees ; leaves pinnate ; fruit indehiscent, fleshy : 5 stamens often reduced to staminodes4. **Averrhoa.**

Flowers irregular ; leaves simple, penninerved ; sepals usually petaloid, the upper spurred ; stamens 5 with subconnate anthers :—

Lateral petals connate in pairs ; fruit capsular, elastically dehiscent

4. **Impatiens.**

Lateral petals free ; fruit a drupe with a bony pyrene...5. **Hydrocera.**

1. **Geranium, Linn.**

Herbs or undershrubs. *Leaves* stipulate. *Peduncles* axillary, bracteate, 1-2-flowered or bearing umbels. *Flowers* regular. *Sepals* and *petals* 5 each, imbricate. *Disk* represented by 5 interpetaline glands. *Stamens* 10 ; free or shortly united at the base, anthers 10 (or rarely only 5). *Ovary* beaked, 5-lobed, 5-celled ; styles 5 ; ovules 2-3, superposed. *Capsule* 5-lobed, 5-celled ; cells 1-seeded, usually separated from the axis by the elastic curving of the lower portions of the beak. *Seeds* with albumen usually 0 ; cotyledons induplicate or contorted.

GERANIUM NEPALENSE, Sweet ; F. B. I. i. 430. *G. affine*, W. & A. 133 (not of Ledeb.) ; Wt. Ill. i. t. 59.

A slender diffuse perennial with pentagonal deeply 3-5-lobed leaves, the lobes cut into strap-shaped segments ; flowers 3-5 in. across ; carpels hairy ; seeds shining, smooth.

Nilgiri and Pulney Hills, usually above 6,000 ft.

Various garden species of *Pelargonium* are found run wild about the Nilgiri Hill stations ; one, *Pelargonium grossularioides*, DC., of S. Africa, appears to be fully naturalized, as is *Erodium cicutarium*, Leman, of Europe and N. India.

2. *Oxalis*, Linn.

Acid herbs, rarely woody. *Leaves* radical or cauline and alternate, usually digitate, 3-many-foliolate. *Flowers* on axillary or radical 1-many-flowered peduncles, usually unbellate, regular. *Sepals* 5, imbricate. *Petals* 5, hypogynous, contorted. *Disk* without glands. *Stamens* 10, filaments free or united at base. *Ovary* of 5 1-many-ovuled cells; styles 5, distinct. *Capsule* loculicidal. *Seeds* with an outer fleshy coat bursting elastically; albumen fleshy.

OXALIS CORNICULATA, Linn.; F. B. I. i. 436; W. & A. 142; Wt. Ic. t. 18.

A diffuse creeping weed with long-stalked trifoliolate leaves with obcordate leaflets; flowers yellow, umbellate, on slender peduncles.

Common in most Districts and at all elevations, especially troublesome in garden soil.

3. *Biophytum*, DC.

Annual or perennial herbs, often with woody stems. *Leaves* crowded at the ends of the stem and branches, abruptly pinnate; leaflets opposite, oblique. *Flowers* dimorphous, in small umbels; peduncles terminal. *Sepals* 5. *Petals* 5, yellow, connate with a salver-shaped corolla. *Stamens* 10, 5 inner ones longer; filaments free. *Ovary* 5-celled; styles 5; stigmas notched or 2-fid. *Capsule* dehiscing loculicidally into 5 spreading valves. *Seeds* like those of *Oxalis*.

Stem simple:—

Leaflet main nerves thick, rarely straight, irregular; sepals usually longer than the capsule:—

Leaflet main nerves numerous, secondary many; leaflets many pairs (8–15); peduncles long; seeds ovoid, acute:—

Leaflets nearly glabrous; seeds prominently ridged, not tubercled; pedicels very short (·1 in.) or 0; stem generally short...1. *sensitivum*.

Leaflets strigosely hirsute; seeds ridged, the ridges with tubercled margins; pedicels short (·1–·2 in.), slender; stem often long, sometimes stout2. *Candolleianum*.

Leaflet main nerves very few, secondary almost none; leaflets few (5–7) pairs; peduncles very short or 0; pedicels ·2 in. long; seeds flattened, ovate, obtuse, with scattered tubercles and no ridges; stems slender3. *Apodiscias*.

Leaflet main nerves slender, oblique, straight; leaflets many (more than 10) pairs; sepals as long as or shorter than the capsule; seeds ovoid, tubercled in spiral lines; peduncles long; pedicels 2-3 in. long, slender; stems often long, usually slender.....4. *Reinwardtii*. Stem branched; seeds tubercled, the tubercles in oblique lines; leaves more or less strigosely hirsute, sharply cuspidate at apex:—

Leaves 3-5 in. long; leaflets 15-25 pairs, oblong, 4-5 in. long; pedicels 1-1.5 in. long; sepals glandular villous.....5. *intermedium*.

Leaves 2-3 in. long; leaflets 30-50 pairs, falcate, 1-2 in. long; pedicels 1 in. long; sepals glabrous6. *polyphyllum*.

1. BIOPHYTUM SENSITIVUM, DC.; F. B. I. i. 436 (*in part*). *Oxalis sensitiva*, L.; W. & A. 142 (*in part*).

Circars, Deccan and Carnatic, usually in open places, on roadsides, banks and cultivated ground.

2. BIOPHYTUM CANDOLLEANUM, Wt. Ill. i. 161, t. 62. *B. sensitivum*, var. *Candolleana*, Edgw. & Hook. f. in F. B. I. i. 437.

W. Gháts, banks and roadsides in Nilgiris, up to 6,000 ft. usually in shady places.

3. BIOPHYTUM APODISCIAS, Turcz.; F. B. I. i. 437.

Mysore or Carnatic (G. Thomson).

4. BIOPHYTUM REINWARDTII, Edgw. & Hook. f.; F. B. I. i. 437.

W. Coast and W. Gháts, from S. Canara to Cochin and the Anamalai Hills, up to 6,000 ft.

5. BIOPHYTUM INTERMEDIUM, Wt. Ill. i. 162; F. B. I. i. 438.

W. Gháts, in the Pulney Hills, up to 7,000 ft.

6. BIOPHYTUM POLYPHYLLUM, Munro in Wt. Ill. i. 162; F. B. I. i. 439.

W. Gháts, Sholas of the W. Nilgiris, at about 6,000 to 7,000 ft.

Averrhoa contains two fruit trees whose native country is unknown, but which are found in gardens in many places in S. India and cultivated for their fruits which are acid and are made into tarts and preserves or pickled. They are distinguished thus:—

Leaflets 2-5 pairs, glabrous and glaucous beneath; fruits with angular lobes*A. Carambola*, L.

Leaflets 5-17 pairs, pubescent beneath; fruits with rounded lobes

A. Bilimbi, L.

4. *Impatiens*, Linn.

Annual or perennial herbs or rarely a little shrubby at the base. *Leaves* simple. *Flowers* irregular, axillary, solitary fascicled racemed or umbelled or sometimes scapose. *Sepals* 3 (or 5), coloured, imbricate, 2 lateral ones small flat usually green, posterior (*lip*), the lower in the flower, large, petaloid, often spurred. *Petals* 3 (or 5) the anterior (*standard*) erect, the side ones (*wings*) entire or 2-3-lobed, sometimes with a short or long and slender appendage at the base. *Stamens* 5; anthers cohering, nearly sessile. *Disk* 0. *Ovary* oblong, 5-celled; ovules many, 1-seriate in each cell; stigma sessile, 5-toothed. *Capsule* short or long, loculicidally dehiscent; valves 5, elastic. *Seeds* smooth or tubercled; albumen 0.

(*Analysis after Sir J. D. Hooker in Rec. Bot. Surv. Ind.* iv. 37, and subsequent descriptions.)

Scapigerous plants with tuberous rootstock; leaves all radical; flowers racemose; seeds very minute, clothed with spiral hairs (Section 1. SCAPIGERAE):—

Lip with a very long incurved spur:—

Wings 2-lobed1. *acaulis*.

Wings 3-lobed2. *scapiflora*.

Lip with a short spur; wings 3-lobed:—

Dorsal auricle of wings obscure or 0:—

Spur of lip incurved, tip inflated3. *Beddomei*.

Spur of lip incurved, cylindric4. *Levingei*.

Spur of lip straight, standard entire5. *modesta*.

Spur of lip short, standard crenate.....6. *crenata*.

Dorsal auricle of wings produced into the spur of the lip:—

Dorsal auricle long slender:—

Tall, spur of lip elongate7. *Denisonii*.

Dwarf, spur of lip short8. *Barberi*.

Dorsal auricle short spiniform9. *Lawsoni*.

Lip spurless10. *orchiodides*.

Epiphytic perennial herbs, succulent, with very short simple or sparingly branched, often annulate or articulate, stems; leaves alternate, usually fascicled at the ends of the branches; flowers on simple or branching few-flowered peduncles; wings very short, thick, almost concealed in the mouth of the lip and concave standard (Section 2. EPIPHYTICAE):—

Lip scarlet:—

- Sepals small, elliptic, green ; standard and wings yellow
11. *Jerdoniae*.
- Sepals large, oblong, pendulous, scarlet ; standard green, wings purple12. *auriculata*.
- Sepals linear, green ; standard green, dorsally broadly winged
13. *parasitica*.
- Lip green ; sepals linear-oblong ; flowers all green14. *viridiflora*.
- Annual herbs ; leaves opposite ; flowers pedicelled, solitary binate or fascicled in the axils of the leaves, without peduncle ; ebracteate or minutely bracteate at base ; sepals elongate, linear, rarely ovate or lanceolate ; seeds glabrous (except *Gardneriana*), usually globose, black and polished (Section 3. *ANNUAE*) :—
- Sepals linear or linear-lanceolate ; seeds black and shining :—
- Spur of lip slender, usually longer than the wings, sometimes shorter or 0 :—
- Stem stiff, usually simple ; leaves broad or narrow, coriaceous :—
- Spur longer than or at least as long as wings ; flowers large ; leaves more or less serrate15. *chinensis*.
- Spur quite short, incurved ; flowers small ; leaves nearly entire :—
- Flowers .6–.8 in. long, rose or rose-purple16. *rupicola*.
- Flowers .2–.4 in. long, violet-blue17. *rivulicola*.
- Stem flaccid, usually branched ; leaves broad or narrow, subentire
18. *diversifolia*.
- Stem slender ; basal lobe of wings 0, dorsal auricle filiform
19. *ligulata*.
- Stem slender, flaccid ; wings long stipitate ; basal lobe minute or 0, dorsal auricle 0 :—
- Leaves elliptic-lanceolate, 1–2.5 in. long ; capsule .5 in. long
20. *Kleinii*.
- Leaves oblong-lanceolate, 3–5 in. long ; capsule .75 in. long
21. *Rheedii*.
- Stem slender, flaccid ; leaves oblong, entire ; wings long stipitate ; basal lobe lanceolate, dorsal auricle small, opposite to it
22. *lenta*.
- Stem slender, flaccid ; wings shortly stipitate ; basal lobe small, dorsal auricle decurved23. *tenella*.
- Stem much branched ; wings subsessile ; basal lobe minute, dorsal auricle minute, near the base24. *debilis*.
- Spur of lip very short or 0 :—
- Lip scaphiform or cymbiform, spur of lip very minute or 0 :—
- Flowers white or rose, very small :—
- Leaves ovate or oblong.....25. *pusilla*.

Leaves narrowly linear.....26. *herbicola*.

Flowers medium-sized, yellow; standard winged.....27. *Lawii*.

Lip funnel-shaped; flowers very small, white: standard-costa mucronate28. *Nataliae*.

Lip saccate, spur of lip very short:—

Glabrous or scurfy; flowers very small; lip shortly saccate

29. *oppositifolia*.

Often pubescent; flowers rose, very small; lip cymbiform, acute; basal lobe of wing almost 0.....30. *pallidiflora*.

More or less pubescent, flowers medium-sized, lip deeply saccate

31. *tomentosa*.

Sepals ovate or ovate-lanceolate; seeds various:—

Leaves opposite, small, sharply serrate, glandular; spur of lip very short, incurved; seeds glabrous, black, shining32. *concinna*.

Leaves opposite and whorled, usually long-glandular-ciliate; seeds hairy33. *Gardneriana*.

Shrub or herbs; leaves opposite, alternate or rarely whorled; flowers pedicelled, the pedicels solitary binate or fascicled in the axils of the leaves, without peduncle; sepals small or minute; seeds smooth, rugose or papillose (Section 4. MICROSEPALAE):—

Leaves opposite alternate and whorled on the same plant; seeds obovoid, rugose or papillose:—

Shrubs, basal lobe of wings smaller than the distal; spur of the lip short incurved:—

Leaves 1–2 in. long, petiole short; stems reddish 34. *Leschenaultii*

Leaves 2–4 in. long, petiole long; stems often with sulphury covering35. *latifolia*.

Shrubs, basal lobe of wings equalling or larger than the distal:—

Stem and branches glaucous, costa of leaf hairy beneath; spur of lip stout36. *cuspidata*.

Stem and branches green; leaves usually glabrous beneath; spur of lip slender:—

Basal lobe of wings much smaller than the distal 37. *floribunda*.

Basal lobe of wings much larger than the distal 38. *macrocarpa*.

Basal lobe of wings equal to the distal, both obcordate

39. *cochinica*.

Herb, annual; lobes of wings subequal; spur of lip very slender

40. *lucida*.

Leaves all alternate:—

Flowers minute; flaccid annuals:—

Leaves ovate; spur of lip 041. *pendula*.

Leaves lanceolate; spur of lip short42. *mysorensis*.

Flowers large or medium-sized, smaller in *I. dasysperma* :—

Capsule pilose or tomentose :—

Lip spurred ; seeds globose, spur incurved :—

Seeds smooth43. *Balsamina*.

Seeds minutely hirtellous44. *trichocarpa*.

Lip spurless ; seeds minute, granulate.....45. *scabriuscula*.

Capsule glabrous ; seeds glabrous or papillose ; spur of lip long :—

Seeds small, minutely papillose :—

Spur of lip 1-1·5 in. long46. *flaccida*.

Spur of lip 0·6 in. long.....47. *dasysperma*.

Seeds large, rugose, glabrous ; flowers large ...48. *pulcherrima*.

Shrubby ; leaves alternate, hairy on both surfaces ; flowers pedicelled, the pedicels solitary in the axils of the leaves without peduncle, ebracteate ; standard and lip tomentose (Section 5. TOMENTOSAE) :—

Flowers small, white and red, wings short49. *Munronii*.

Flowers very large, white, wings large.....50. *Hensloviana*.

Herbs or shrubs ; leaves opposite or alternate rarely whorled ; flowers umbellate or in very contracted racemes terminating a long axillary peduncle ; pedicels bracteate at the base (Section 6. SUBUMBELLATAE) :—

Shrubs or large branching herbs :—

Leaves alternate ; sepals orbicular, ovate or oblong, ·25-·75 in. long :—

Spur longer than the limb of the lip :—

Flowers very large ; sepals oblong, acute ; lip with spur tubiform

51. *grandis*.

Flowers medium-sized ; sepals orbicular, cuspidate ; bracts slender52. *fruticosa*.

Flowers medium-sized ; sepals ovate-acuminate, bracts ovate

53. *viscida*.

Spur shorter than limb of the lip or 0 :—

Sepals ovate, aristately acuminate ; spur of lip ·1 in. long or 0

54. *campanulata*.

Sepals oblong, acute ; spur of lip ·25-·5 in. long55. *disotis*.

Leaves opposite and whorled ; sepals linear ; spur long, slender

56. *verticillata*.

Annual herbs :—

Leaves all opposite :—

Dorsal auricle of wings filiform, enclosed in the spur of the lip, except sometimes in *I. omissa* ; peduncle many-flowered :—

Leaves ovate, petioled, 1-2 in. long :—

Spur of lip shorter or longer than the wings, not inflated

57. *Goughii*.

Spur of lip longer than the wings, inflated58. *viscosa*.

Leaves oblong or elliptic, subsessile, .25–1 in. long...59. *omissa*.
 Dorsal auricle of wings minute; peduncle 1-flowered; leaves .2–.5 in. long, subsessile60. *parvifolia*.

Leaves all alternate :—

Leaves scattered on the stem and branches :—

Spur of lip long, slender.....61. *cordata*.
 Spur of lip short, stout, tip incurved62. *uncinata*.
 Spur of lip short, slender, straight63. *verecunda*.
 Spur of lip 064. *elegans*.

Leaves rosulate at the top of the simple stem :—

Spur of lip long and slender65. *umbellata*.
 Spur of lip short, stout66. *travancorica*.

Shrubs; leaves alternate; flowers in elongate peduncled axillary racemes; pedicels bracteate at the base; sepals orbicular or broadly oblong; lip spurred; seeds various (Section 7. *RACEMOSAE*) :—

Leaves long-petioled, ovate :—

Distal lobe of wings stipitate with a minute basal lobe at the base of the stipes.....67. *maculata*.

Distal lobe of wings sessile :—

Lip tubiform, incurved throughout its length68. *phoenicea*.
 Lip cymbiform or infundibular; spur short, incurved

69. *Wightiana*.

Leaves subsessile, lanceolate.....70. *Tangachee*.

1. *IMPATIENS ACAULIS*, Arn.; F. B. I. i. 443.

W. Gháts, up to 7,000 ft. in Nilgiris.

Flowers rather large, pale pink.

2. *IMPATIENS SCAPIFLORA*, Heyne; F. B. I. i. 443. *I. rivalis*,
 Wt. Ic. t. 751; F. B. I. i. 444.

W. Gháts from S. Canara to Travancore, at 6,000 to 8,000 ft., usually on dripping rocks.

Flowers pink, darker at the base of the wing.

3. *IMPATIENS BEDDOMEI*, Hook. f. in F. B. I. i. 442.

W. Gháts, at 6,000 to 8,000 ft. in Nilgiris, on the downs.

Flowers white with yellow patches on the wings.

4. *IMPATIENS LEVINGEI*, Gamble ex Hook. f. in Rec. Bot. Surv.
 Ind. iv. 45

W. Gháts, in the Nilgiri Hills, at 6,000 ft., on rocks near Coonoor and Hulikal (Gamble, Levinge).

Flowers carmine-red.

5. *IMPATIENS MODESTA*, Wt. Ic. t. 968; F. B. I. i. 442.

W. Gháts, in the Nilgiri, Anamalai and Sivagiri Hills, at 6,000 ft.

Flowers pink.

6. *IMPATIENS CRENATA*, Bedd.; F. B. I. i. 442.

W. Gháts, in the Anamalai Hills, at 5,000 to 8,000 ft.

Flowers blue inside.

7. *IMPATIENS DENISONII*, Bedd. Ic. t. 151; F. B. I. i. 444.

W. Gháts, on the Sispara Ghát, Nilgiris, at 3,000 to 5,000 ft.

Flowers pink.

8. *IMPATIENS BARBERI*, Hook. f. in Rec. Bot. Surv. Ind. iv. 45.

W. Gháts, at Cadamany in Mysore (Barber).

9. *IMPATIENS LAWSONI*, Hook. f. in Rec. Bot. Surv. Ind. iv. 45.

W. Gháts, in the Nilgiri Hills.

10. *IMPATIENS ORCHIOIDES*, Bedd. Ic. t. 152; F. B. I. i. 443.

W. Gháts, on tree-trunks at Avalanché, Nilgiris, 8,000 ft.

Flowers reddish brown, a very small species.

11. *IMPATIENS JERDONIAE*, Wt. Ic. t. 1602; F. B. I. i. 460, *excl. I. parasitica*, Bedd.

W. Gháts, on tree-branches and moist rocks at Sispara Ghát, 3,000 to 5,000 ft., Anamalai Hills at 7,000 ft.

A succulent epiphyte with thick stems.

12. *IMPATIENS AURICULATA*, Wt.; F. B. I. i. 460.

W. Gháts, on tree-trunks, hills of Tinnevely and Travancore, above 5,000 ft.

A succulent epiphyte with swollen stem-internodes.

13. *IMPATIENS PARASITICA*, Bedd. Ic. t. 140. *I. Jerdoniae* var. *parasitica*, Hook. f. in F. B. I. i. 460.

W. Gháts, on tree-trunks on the Anamalai Hills at 5,000 to 7,000 ft.; Hills of Cochin and Travancore.

A very succulent epiphyte, with swollen internodes.

14. *IMPATIENS VIRIDIFLORA*, Wt.; F. B. I. i. 460; Bedd. Ic. t. 141.

W. Gháts, epiphytic on tree-trunks in the Sivagiri Hills, Tinnevely, at 5,000 ft. (Wight).

A fleshy epiphyte.

15. *IMPATIENS CHINENSIS*, Linn.; F. B. I. i. 444. *I. fasciculata*, Lamk.; Wt. Ic. t. 748; W. & A. 128.

E. Gháts, Madgol Hills, at 5,000 ft.; W. Gháts, common in all Districts in wet places and pastures at 5,000 to 8,000 ft.

Flowers rose-purple to white.

16. *IMPATIENS RUPICOLA*, Hook. f. in Kew Bull. 1910, 292.
Mysore at Shimoga, 2,000 to 3,000 ft. (Meebold).
17. *IMPATIENS RIVULICOLA*, Hook. f. in Kew Bull. 1911, 354.
W. Gháts, in the Puriar Valley, Travancore, 4,000 ft. (Meebold), borders of streams.
18. *IMPATIENS DIVERSIFOLIA*, Wall.; F. B. I. i. 446; W. & A. 139.
W. Gháts, from S. Canara to Travancore: in Nilgiris, up to 6,000 ft.
Flowers rose.
19. *IMPATIENS LIGULATA*, Bedd. Ic. t. 149; F. B. I. i. 446.
W. Gháts, Anamalai Hills at 1,500 to 2,500 ft., Hills of Malabar, Cochin and Travancore.
Flowers pink or white.
20. *IMPATIENS KLEINII*, W. & A. 140; F. B. I. i. 445; Wt. Ic. t. 884; Hook. f. in Kew Bull. 1910, 293.
W. Coast and Gháts, in most Districts, from sea-level up to 6,000 ft.
A slender plant, scarcely 1 ft. high, flowers violet-purple.
21. *IMPATIENS RHEEDII*, W. & A. 138.
W. Gháts, in Malabar at low elevations (Barber, Bourne).
Flowers pink or mauve with darker streaks.
22. *IMPATIENS LENTA*, Hook. f. in Hook. Ic. t. 2913.
W. Gháts, in the Nilgiri Hills (Perrottet).
Flowers lilac (?).
23. *IMPATIENS TENELLA*, Heyne; W. & A. 140; F. B. I. i. 447
excl. syn. I. rosmarinifolia, Retz.
W. Gháts, in the Nilgiris, at 6,000 ft.
A slender plant scarcely 10 in. high, flowers pink (?).
24. *IMPATIENS DEBILIS*, Turcz. in the Bull. Soc. Imp. Nat. Mosc. xxxii. i. 272; Hook. Ic. t. 2911.
W. Gháts, in the Nilgiri Hills (Perrottet).
Flowers small, pink.
25. *IMPATIENS PUSILLA*, Heyne; Hook. f. in Kew Bull. 1910, 293. *I. inconspicua*, Benth.; F. B. I. i. 447; W. & A. 139; Wt. Ic. t. 970. *I. rosmarinifolia*, Wt. Ic. t. 750 (*not of* Retz).
W. Gháts, in all Districts at 3,000 to 8,000 ft., very common in Ootacamund Cinchona Plantations, under trees.
A small herb scarcely 1 ft. high, flowers white streaked with lilac.

26. *IMPATIENS HERBICOLA*, Hook. f. in Kew Bull. 1911, 354.
W. Gháts, in Travancore Hills, at 4,500 ft., in grass (Meebold); Ibex Hill, Anamalais (Fischer).
27. *IMPATIENS LAWII*, Hook. f. and Th.; F. B. I. i. 448.
W. Gháts, Bababuden Hills of Malabar (Law).
Flowers purple or rose.
28. *IMPATIENS NATALIAE*, Hook. f. in Kew Bull. 1910, 294.
N.-W. Mysore, at Kumsi in Shimoga, up to 3,000 ft. (Meebold).
Flowers white with a pink spur.
29. *IMPATIENS OPPOSITIFOLIA*, Linn.; F. B. I. i. 448; W. & A. 139; Wt. Ic. t. 883.
W. Gháts, in all Districts, common at 3,000 to 5,000 ft.
Flowers pink.
30. *IMPATIENS PALLIDIFLORA*, Hook. f. in Kew Bull. 1911, 354.
W. Gháts, straggling among grass at Devicolam in Travancore, 7,000 ft. (Meebold).
Flowers pink.
31. *IMPATIENS TOMENTOSA*, Heyne; W. & A. 139; F. B. I. i. 449; Wt. Ic. t. 749. *I. rufescens*, Benth.; W. & A. 138; Wt. Ic. t. 969.
W. Gháts, Nilgiris to Travancore, in boggy places, at 5,000 to 8,000 ft.
Flowers pink.
32. *IMPATIENS CONCINNA*, Hook. f. in F. B. I. i. 449.
W. Gháts, in Malabar? (Wight).
33. *IMPATIENS GARDNERIANA*, Wt. Ic. t. 1050; F. B. I. i. 445. *I. setosa*, Hook. f. & T.; F. B. I. i. 445.
W. Gháts, below Sispara, in W. Nilgiris, in moist pasture, 1,500 to 5,000 ft.; Wynaad in Malabar.
Flowers bright red or purple.
34. *IMPATIENS LESCHENAULTII*, Wall.; F. B. I. i. 450; W. & A. 136; Wt. Ic. t. 970 *bis*.
W. Gháts, common in the Nilgiri and Pulney Hills at 3,000–8,000 ft.
An erect shrub of Shola forest, flowers pink or white, the lip yellow.
35. *IMPATIENS LATIFOLIA*, Linn.; F. B. I. i. 450 *excl. syn.* *I. cuspidata*, W. & A.; W. & A. 138 (*in part*). *I. bababudanensis*, Hook. f. in Kew Bull. 1910, 295 (probably).

W. Gháts, S. Canara to the Pulney Hills, up to 8,000 ft.

A shrub, flower pale purple.

36. *IMPATIENS CUSPIDATA*, Wt. Ic. t. 741.

W. Gháts, in the Nilgiri Hills at 5,000 to 7,000 ft.

A shrubby plant with conspicuous glaucous-white stem and branches ; flowers pink.

37. *IMPATIENS FLORIBUNDA*, Wt. *I. flaccida*, Arn. ; F. B. I. i. 457 (*in part*).

W. Gháts, from Nilgiri Hills, 6,000 to 7,000 ft., to Travancore.

38. *IMPATIENS MACROCARPA*, Hook. f. in Kew Bull. 1911, 355.

W. Gháts, in Travancore at about 6,000 ft. (Meebold).

A tall weak subshrubby species.

39. *IMPATIENS COCHINICA*, Hook. f. in Kew Bull. 1911, 355.

W. Gháts, in Cochin, at Kalvalay, near a stream, about 2,000 ft. (Meebold).

A small semishrubby species.

40. *IMPATIENS LUCIDA*, Heyne ; F. B. I. i. 451, *excl. syn. I. latifolia*, W. & A.

W. Gháts, from S. Canara to Travancore, up to 4,000 ft.

41. *IMPATIENS PENDULA*, Heyne ; F. B. I. i. 455 ; W. & A. 137.

W. Gháts, in the Bababudan Hills of Mysore (Rottler).

42. *IMPATIENS MYSORENSIS*, Roth ; F. B. I. i. 456 ; W. & A. 137.

W. Gháts, in Mysore (Rottler).

43. *IMPATIENS BALSAMINA*, Linn. ; F. B. I. i. 453 ; W. & A. 135.

I. arcuata, Wall. ; W. & A. 136.

In all Districts, in hilly regions but at low levels.

The wild form of the garden Balsam, very variable in size, leaf and flower ; flowers usually pink.

44. *IMPATIENS TRICHOCARPA*, Hook. f. in Hook. Ic. t. 2914.

W. Gháts, in the Nilgiri Hills (Perrottet).

45. *IMPATIENS SCABRIUSCULA*, Heyne ; F. B. I. i. 454 ; Bedd. Ic. t. 144.

W. Gháts, from S. Canara and Coorg to the Wynaad and Nilgiris, up to 6,000 ft.

A small species, sometimes scarcely 6 in., occasionally up to 18 in. high, flowers pink.

46. *IMPATIENS FLACCIDA*, Arn.; F. B. I. i. 457 *excl.* Bot. Mag. t. 5625, etc.
W. Gháts, in the Sivagiri Hills of Tinnevely; W. Coast, in Cochin at Trichoor. Flowers rose-purple.
47. *IMPATIENS DASYSPERMA*, Wt. Ic. t. 742; F. B. I. i. 457.
W. Gháts, Hills of Mysore, Courtallum in Tinnevely, up to 3,000 ft.
48. *IMPATIENS PULCHERRIMA*, Dalz., F. B. I. i. 458.
W. Gháts, in Mysore (*vide* Hook. f.).
Flowers rose or violet-purple.
49. *IMPATIENS MUNRONII*, Wt. Ill. i. 160, Ic. t. 1049; F. B. I. i. 456.
W. Gháts, in forest round Sispara, Nilgiris, at 5,000 to 6,500 ft.
An undershrub, up to 2 ft. high, flowers white and red.
50. *IMPATIENS HENSLOVIANA*, Arn.; F. B. I. i. 458. *I. albida*, Wt. Ic. t. 743.
W. Gháts, in the Nilgiri, Pulney and Tinnevely Hills, in ravines and clefts of rocks at 2,000 to 7,000 ft.
An undershrub with large white flowers and stems with many prominent scars of fallen leaves.
51. *IMPATIENS GRANDIS*, Heyne; F. B. I. i. 463; W. & A. 137; Bedd. Ic. t. 153.
W. Gháts, Hills of S. Travancore and Tinnevely at 1,000 to 4,000 ft.
Tall and shrubby, flowers white flaked with crimson.
52. *IMPATIENS FRUTICOSA*, DC.; F. B. I. i. 459; W. & A. 137; Wt. Ic. t. 966.
W. Gháts, common in the Nilgiri, Pulney and Travancore Hills at 5,000 to 6,000 ft., in Shola forests.
An erect shrub, reaching 8 ft. in height, flowers pink.
53. *IMPATIENS VISCIDA*, Wt.; F. B. I. i. 462; Wt. Ic. t. 746.
W. Gháts, Pulney Hills, in Madura District, at 5,000 to 7,000 ft., in wet swampy ground.
Stem reaching 2-3 ft. in height, flowers light purple or deep pink.
54. *IMPATIENS CAMPANULATA*, Wt.; F. B. I. i. 463; Wt. Ic. t. 744.
W. Gháts in the Nilgiri, Anamalai and Pulney Hills at 6,000 to 7,000 ft.

An erect herb reaching 5 ft. in height, flowers white and yellow, speckled with purple.

55. *IMPATIENS DISOTIS*, Hook. f. in Rec. Bot. Surv. Ind. iv. 48.

W. Gháts, in the Hills of Travancore and Tinnevely at 4,000 ft.

An erect herb, flowers white.

56. *IMPATIENS VERTICILLATA*, Wt. ; F. B. I. i. 452.

W. Gháts, in the Anamalais, the Hills of Cochin, the Sivagiri Hills of Tinnevely, in gravelly beds of streams at 3,000 ft., and the Travancore Hills at 4,000 to 5,000 ft.

A herb, up to 18 in. high; flowers bright red or scarlet.

57. *IMPATIENS GOUGHII*, Wt. Ill. i. 160; Wt. Ic. t. 1603; F. B. I. i. 452. *I. anamallayensis*, Bedd. Ic. t. 150. *I. microtheca*, Hook. f. in Hook. Ic. t. 2910.

W. Gháts, in the Nilgiri, Anamalai, Pulney and Travancore Hills at 5,000 to 8,000 ft.

A slender annual, reaching about 12 in. in height at most; flowers pink, on long filiform peduncles.

58. *IMPATIENS VISCOSA*, Bedd. ; F. B. I. i. 453.

W. Gháts, in the Anamalai Hills and the Hills of Malabar, Cochin and Travancore at 3,000 to 4,000 ft.

59. *IMPATIENS OMISSA*, Hook. f. in Rec. Bot. Surv. Ind. iv. 48.

W. Gháts, Anamalai and Pulney Hills at 6,000 to 7,000 ft.

A very small slender plant.

60. *IMPATIENS PARVIFOLIA*, Bedd. ; F. B. I. i. 453; Bedd. Ic. t. 142.

W. Gháts, on rocks on the top of Akka Mountain, Anamalais, at 8,000 to 8,600 ft. (Beddome).

A very small species, scarcely 6 in. high, flowers pale pink with crimson blotches.

61. *IMPATIENS CORDATA*, Wt. ; F. B. I. i. 462.

W. Gháts, in the Wynaad, the Anamalai Hills at 3,000 to 5,000 ft., Sivagiri Hills of Tinnevely and Hills of Travancore.

A small plant about 1 ft. high; flowers lilac with a purple centre.

62. *IMPATIENS UNCINATA*, Wt. ; F. B. I. i. 465; Wt. Ic. t. 747.

W. Gháts, in dense moist forests about Courtallum in Tinnevely (Wight).

A small plant scarcely 10 in. high with the spur of the lip hooked.

63. *IMPATIENS VERECUNDA*, Hook. f. in Kew Bull. 1911, 356.
W. Gháts, at Periakanal and Devicolam, Travancore, at 4,000 to 5,000 ft. (Meebold), under trees.
A small herb about 6 in. high, flowers rose.
64. *IMPATIENS ELEGANS*, Bedd. Ic. t. 145; F. B. I. i. 465.
W. Gháts, common on the Anamalai Hills and Hills of Travancore at 2,500 to 5,000 ft. (Beddome).
A small plant up to 1 ft. high; flowers pale rosy-white, with a purple eye.
65. *IMPATIENS UMBELLATA*, Heyne; F. B. I. i. 461; W. & A. 137; Wt. Ic. t. 745.
W. Gháts, in moist forests near Courtallum in Tinnevely.
A small plant, scarcely 8 in. high; leaves broadly crenate often purplish beneath.
66. *IMPATIENS TRAVANCORICA*, Bedd. Ic. t. 143; F. B. I. i. 464.
W. Gháts, at Myhendra and Aghasteer, Travancore Hills, 4,000 to 5,000 ft. (Beddome).
A small plant, scarcely 8 in. high; flowers white streaked with red, leaves crenate, ciliate in the crenatures.
67. *IMPATIENS MACULATA*, Wt.; F. B. I. i. 465.
W. Gháts, Sivagiri Hills of Tinnevely at 4,000 to 7,000 ft., Hills of Travancore at 5,000 ft.
A tall slender herb reaching 6 ft. in height.
68. *IMPATIENS PHOENICEA*, Bedd.; F. B. I. i. 466; Bedd. Ic. t. 148.
W. Gháts, abundant in the higher Sholas of the Pulney Hills at 5,000 to 7,000 ft.
An erect suffruticose herb; flowers brilliant scarlet, yellow in the centre.
69. *IMPATIENS WIGHTIANA*, Bedd. Ic. t. 146; F. B. I. i. 467.
W. Gháts, in moist forests on the Anamalais at 3,000 to 4,500 ft. (Beddome).
An erect branched suffruticose herb; flowers white, the standard and wings mottled with pink.
70. *IMPATIENS TANGACHEE*, Bedd. Ic. t. 147; F. B. I. i. 467.
W. Gháts, in river-beds on the higher ranges of the Anamalais, above 4,000 ft.; Bolumpatti Hills of Coimbatore.
A short, simple or forked herb up to 10 in. high with subprocumbent stem; flowers bright rose.

5. *Hydrocera*, Blume.

Erect aquatic herbs. *Leaves* narrow, alternate; stipules 0. *Flowers* irregular, on short axillary 1-2-flowered peduncles. *Sepals* 5, petaloid, imbricate, the 2 lateral outer flat, the posterior spurred. *Petals* 5, anterior outermost in bud large, concave. *Disk* 0. *Stamens* 5; filaments short, broad; anthers connate. *Ovary* 5-celled; stigmas 5, sessile; ovules 2-3 in each cell. *Fruit* an indehiscent drupe with a bony, truncate, 5-celled stone. *Seed* in each cell solitary, curved, corrugated; albumen 0; cotyledons thick; radicle short, superior.

HYDROCERA TRIFLORA, W. & A. 140; F. B. I. i. 483.

An annual water-weed with fistular floating stems rooting at the nodes, linear-lanceolate leaves and red globose succulent fruit.

Ditches and tanks in the Carnatic.

Family XXXIV. RUTACEAE.

Trees or shrubs, sometimes climbing, rarely herbs, abounding in pellucid glands filled with essential oil. *Leaves* opposite or alternate, usually compound, exstipulate. *Flowers* usually hermaphrodite and regular, in axillary or terminal cymes or panicles, never in spikes, rarely in racemes. *Calyx* of 4-5, rarely 3, small lobes. *Petals* 4-5, rarely 3, hypogynous, valvate or imbricate. *Disk* annular, crenate or lobed, sometimes elongate. *Stamens* usually either as many as the petals or twice as many, sometimes more; filaments usually free, inserted around the disk; anthers 2-celled, introrse. *Ovary* of 4-5, sometimes 3, sometimes more, free or connate carpels; styles as many as the carpels, free or more or less connate; stigmas terminal, entire or lobed; ovules usually 2 in each cell, sometimes numerous. *Fruit* a capsule berry or drupe, or of 1-4 capsular cocci. *Seeds* usually solitary in the cells, sometimes numerous; testa various; albumen fleshy or 0; embryo straight or curved; radicle superior.

Seeds albuminous; flowers usually polygamous or monoecious:—

Fruit dehiscent, of 1-5 separate 1-seeded carpels:—

Leaves opposite; unarmed trees or shrubs:—

Stamens 4-5; leaves 2-foliolate1. *Evodia*.

Stamens 8; leaves 1-foliolate2. *Melicope*.

Leaves alternate; trees or shrubs, usually armed; stamens 3-5; leaves 3- or more-foliolate.....3. **Zanthoxylon.**

Fruit indehiscent, syncarpous:—

Stamens as many as the petals; fruit 4-6-celled; monoecious; prickly shrubs, usually climbing.....4. **Toddalia.**

Stamens usually double as many as the petals; fruit 2-4-celled; unarmed trees:—

Dioecious; petals usually 2; fruit 2-celled; leaves 3-foliolate

5. **Vepris.**

Polygamous; petals 4; fruit 4-celled; leaves 1-foliolate

6. **Acronychia.**

Seeds exalbuminous; flowers usually hermaphrodite:—

Fruit dehiscent, capsular, 3-celled, each cell about 4-seeded; trees with pinnate leaves and small leaflets7. **Chloroxylon.**

Fruit indehiscent, a berry:—

Ovules 1 or 2 in each cell:—

Style short, persistent; ovule 1 in each cell; leaves 1-foliolate to pinnate8. **Glycosmis.**

Style articulate at top of ovary, deciduous:—

Unarmed plants; leaves pinnate with alternate leaflets:—

Petals usually valvate; cotyledons much crumpled; stamens 109. **Micromelum.**

Petals imbricate; cotyledons plano-convex:—

Filaments dilated below; stamens 8-10, anthers rather large10. **Clausena.**

Filaments subulate; stamens 10, anthers small

11. **Murraya.**

Armed plants; leaves 1-3-foliolate or pinnate with opposite leaflets:—

Leaves 3-foliolate or imparipinnate with opposite leaflets:—

Calyx distinctly lobed:—

Calyx 3-lobed; stamens 6; leaves always 3-foliolate

12. **Triphasia.**

Calyx 4-5-lobed; stamens 8 or 10; leaves imparipinnate or 3-foliolate13. **Limonia.**

Calyx cupular, entire or obscurely 4-6-lobed; stamens 8-10; leaves always 3-foliolate14. **Luvunga.**

Leaves 1-foliolate:—

Anthers linear-oblong; stamens 8-10; disk columnar

15. **Paramignya.**

Anthers ovate-cordate or rarely linear-oblong; stamens 6-8; disk annular or cupular.....16. **Atalantia.**

Ovules more than 2 in each cell ; stamens 10 or more ; armed trees with large fruits :—

Stamens 10–12 ; ovary 5–6-celled, at length 1-celled ; leaves pinnate ; rind of fruit woody ; flowers polygamous

17. **Feronia**.

Stamens 20–60 ; ovary usually many-celled ; flowers hermaphrodite :—

Leaves 3-foliolate ; stamens 30–60 ; ovary 8- or more-celled ; rind of fruit woody18. **Aegle**.

Leaves 1-foliolate ; stamens 20–60 ; ovary many-celled ; rind of fruit leathery19. **Citrus**.

1. **Evodia**, Forst.

Trees or shrubs, unarmed. *Leaves* opposite, simple or 1–3-foliolate or imparipinnate ; leaflets entire, pellucid-punctate. *Flowers* small, unisexual, in axillary paniculate cymes. *Sepals* 4–5, imbricate. *Petals* 4–5, sessile, valvate or slightly imbricate. *Disk* 4–5-lobed. *Stamens* 4–5, inserted at the base of the disk, in ♀ replaced by staminodes ; filaments subulate ; anthers oblong. *Ovary* deeply 4-lobed, 4-celled ; ovules 2 in each cell ; style basilar ; stigma 4-lobed. *Fruit* of 4 coriaceous, 3-valved, 1-seeded cocci ; endocarp horny, elastically separable, 2-lobed. *Seeds* oblong ; testa bony or crustaceous, shining ; hilum linear ; albumen fleshy ; embryo straight, cotyledons ovate.

EVODIA LUNUR-ANKENDA, Merr. *E. Roxburghiana*, Benth. ; F. B. I. i. 487. *Zanthoxylum triphyllum*, Juss. ; Wt. Ic. t. 204.

A small tree with smooth grey bark ; leaves 3-foliolate, petioles up to 4 in. long ; leaflets glabrous, shining, obovate or lanceolate, obtuse or acuminate, 2–5 in. long or longer in young plants ; nerves 10–18 pairs ; cymes variable, sometimes large and spreading ; seeds black, shining.

W. Ghâts, from Mysore to Tinnevely, up to 7,000 ft., in evergreen and secondary forests ; E. Ghâts, Rumpā Hills in Godavari.

Wood white, close-grained. Vern. *Mal.* Kanalei.

2. **Melicope**, Forst.

Shrubs. *Leaves* usually opposite, 1–3-foliolate, pellucid-punctate. *Flowers* in axillary cymes or panicles. *Sepals* 4. *Petals* 4, sessile, valvate or imbricate. *Disk* large, entire or 8-lobed or

obsolete. *Stamens* 8, inserted at the base of the disk, those opposite the petals shorter; filaments subulate or flattened; anthers oblong or cordate. *Ovary* 4-celled, deeply 4-lobed; style basilar or styles 4 subterminal, more or less combined; stigma capitate, 4-lobed; ovules 2 in each cell. *Fruit* of 4 cocci, dehiscing on the inner face. *Seeds* oblong; testa black, shining; albumen fleshy; cotyledons oblong; radicle short, superior.

MELICOCPE INDICA, Wt. Ic. t. 1051; F. B. I. i. 492.

A shrub with opposite leaves and unifoliolate leaflets with rather long petioles; leaflets elliptic or obovate; flowers 3-5 on long axillary peduncles.

W. Ghâts, in the Kundahs range of the Nilgiris, 6,000 to 8,000 ft.

3. *Zanthoxylum*, Linn.

Trees or erect or climbing shrubs, often armed with stout prickles. *Leaves* alternate, trifoliolate or imparipinnate; leaflets opposite or alternate, entire or crenate, often oblique, pellucid-punctate. *Flowers* small, in axillary or terminal, usually paniculate, cymes, often unisexual. *Calyx* 3-8-fid, rarely 0. *Petals* 3-5, sometimes 0. *Disk* small or obscure. *Stamens* 3-5, hypogynous, reduced to scales in ♀ flowers. *Ovary* in ♂ rudimentary, in ♀ or ♀ flowers of 1-5 oblique 1-celled carpels; styles sublateral, free or connate above; stigmas capitate; ovules 2 in each cell. *Fruit* of 1-5 globose, coriaceous or fleshy 1-seeded carpels dehiscing ventrally; endocarp horny. *Seed* oblong or globose, often hanging out of the carpel; testa shining, hard; albumen fleshy; cotyledons flat; radicle short.

Petals 0; leaves pinnate, the petiole and rhachis winged; a prickly shrub.....1. *alatium*.

Petals present; petiole and rhachis of leaves not winged:—

Leaves 3-foliolate; a glabrous shrub, unarmed or with short straight prickles; cymes in slender panicles.....2. *ovalifolium*.

Leaves pinnate:—

Climbing shrub with stems, rhachis of leaf and even leaf-midribs with many hooked prickles; cymes axillary and terminal

3. *tetraspermum*.

Erect trees with many unequal-sided leaflets and conical prickles on stem:—

Leaflets entire, very unequal-sided, rounded on the upper, acute on the lower; large tree.....4. *Rhetsa*.

Leaflets crenate, glandular in the crenatures, slightly unequal-sided ; small tree or treelet5. *Budrunga*.

1. *ZANTHOXYLUM ALATUM*, Roxb. ; F. B. I. i. 493.

E. Gháts, Hills of Ganjam and Vizagapatam, at about 4,500 ft.

2. *ZANTHOXYLUM OVALIFOLIUM*, Wt. Ill. i. 169 ; F. B. I. i. 492.

W. Gháts, from S. Canara to Tinnevely, up to 4,000 ft.

3. *ZANTHOXYLUM TETRASPERMUM*, W. & A. 148 ; F. B. I. i. 494.

W. Gháts, in Coorg, Nilgiris and Anamalais at 4,000 to 6,000 ft.

4. *ZANTHOXYLUM RHETSA*, DC. ; F. B. I. i. 495 ; W. & A. 148.

E. Gháts, from Ganjam to the Godavari, up to 3,000 ft ; W. Gháts, in S. Canara, Mysore, Malabar, Anamalais and Travancore at low elevations.

A striking large deciduous tree having cream-coloured corky bark with conical spines. Wood yellowish-grey, moderately hard. The fruits are aromatic, tasting of pepper. Vern. *Tel.* Rhesta máu ; *Mal.* Katta murrakku, Mulillam.

5. *ZANTHOXYLUM BUDRUNGA*, Wall. ; F. B. I. i. 495.

E. Gháts, Madgol Hills of Vizagapatam at 3,500 ft. (A. W. Lushington).

4. *Toddalia*, Juss.

Shrubs, erect or climbing, generally armed with recurved prickles. *Leaves* alternate, trifoliolate, the leaflets obovate, sessile, gland-dotted. *Flowers* small, unisexual, in axillary or terminal cymes or panicles. *Calyx* short, 5-lobed. *Petals* 5-6, oblong, valvate. *Stamens* in ♂ flowers as many as the petals and slightly longer, filaments slender, anthers oblong, introrse, with a small gland on the back ; in ♀ flowers reduced to staminodes with minute rudimentary anthers. *Ovary* in ♂ flowers rudimentary with columnar style : in ♀ flowers oblong or globose, 5-6-celled ; style 0 ; stigma capitate ; ovules in each cell 2, superposed. *Fruit* subglobose, 4-6-celled, fleshy. *Seeds* one in each cell, angled, reniform, testa crustaceous ; albumen fleshy ; embryo curved, cotyledons oblong.

TODDALIA ASIATICA, Lamk. *T. aculeata*, Pers. ; F. B. I. i. 497 ; W. & A. 149 ; Wt. Ill. t. 66.

A very variable plant with three varieties, and occasional intermediates:—

A stout climbing shrub, very prickly; leaflets abruptly obtusely acuminate at apex, 2-4 in. long and 1-1.5 in. broad; flowers rather large; fruit large, fleshy, hardly lobed1. *floribunda*.

A slender very prickly climbing shrub; leaflets narrow, obtusely acute, 1-2 in. long, .5-.75 in. broad; flowers small, usually in elongate panicles; fruit small, much lobed.....2. *gracilis*.

An erect bush, unarmed or only slightly prickly; leaflets obtuse at apex, 1-1.5 in. long, .5-.75 in. broad; flowers small, in short dense panicles; fruit as in 23. *obtusifolia*.

Variety 1 is found in forests in almost all Districts, and is conspicuous by the corky protuberances bearing spines on the stems; variety 2 occurs in dry Districts, chiefly in the Circars and Carnatic; variety 3 is only found in the Nilgiris at about 6,000 ft.

5. *Vepris*, Comm.

Trees or shrubs, unarmed. *Leaves* alternate, 1-3-foliolate, the leaflets usually petiolulate, gland-dotted. *Flowers* small, in terminal or axillary panicles. *Calyx* small, saucer-shaped, 2- or more-lobed. *Petals* 2-4, lanceolate or ovate, more or less imbricate. *Stamens* in ♂ flowers twice or three times as many as the petals, inserted under the disk, filaments slender, anthers ovate; in ♀ flowers reduced to minute staminodes with small rudimentary anthers. *Ovary* in ♂ flowers small, ovoid, 2-cleft at apex: in ♀ flowers globose, 2-4-celled; styles 0; stigma capitate; ovules in each cell 2, collateral. *Fruit* globose or oblong, 2-4-celled, fleshy. *Seeds* one in each cell, flattened, oblong, testa crustaceous; albumen fleshy; embryo flat, cotyledons thick, ovate; radicle stout.

VEPRIS BILOCULARIS, Engl. *Toddalia bilocularis*, W. & A. 149; F. B. I. i. 497; Bedd. Ic. t. 167.

A large handsome evergreen tree with trifoliolate leaflets up to 9 in. long and about 3 in. broad, with many close parallel nerves and an intramarginal nerve; petals 3; stamens 6; fruit oblong, .5 in. long, 2-celled.

Forests of Malabar, the Anamalais and Travancore, up to 4,000 ft.

6. *Acronychia*, Forst.

Trees. *Leaves* opposite or alternate, 1- rarely 3-foliolate; leaflets entire, pellucid-punctate. *Flowers* polygamous, in axil-

lary or terminal cymes or corymbs. *Calyx* 4-lobed, lobes imbricate. *Petals* 4, spreading, valvate. *Disk* thick, 8-angled, tomentose. *Stamens* 8, inserted under the disk, filaments subulate, the alternate ones longer. *Ovary* 4-celled, inserted on the hollowed top of the disk; style terminal; stigma 4-grooved; ovules 2 in each cell, superposed. *Fruit* a 4-celled drupe or 4-valved loculicidal capsule. *Seeds* 1-2 in each cell; testa black; albumen copious; embryo straight; cotyledons oblong, flat.

Branchlets rather stout, grey; leaflet 3-9 in. long, thick; flowers in rather stout long-pedunculate corymbs, 3-6 in. long; petals .2 in. long, the base inside with white retrorse hairs1. *laurifolia*. Branchlets slender, reddish; leaflet 1-3 in. long, thin; flowers in slender panicles of cymes under 1 in. long; petals under .2 in. long, nearly glabrous within2. *Barberi*.

1. ACRONYCHIA LAURIFOLIA, Blume; F. B. I. i. 498. *Cyminosma pedunculata*, DC.; W. & A. 147; Wt. Ill. i. t. 65.

N. Circars in the Hills of Vizagapatam; S. Deccan slopes in Salem; W. Gháts, common in hill forests up to 6,000 ft. A small evergreen tree, drupes subglobose, apiculate. Wood greyish-white, smooth. Vern. *Tam.* Mutta nári; *Mal.* Vidu Kanalei.

2. ACRONYCHIA BARBERI, Gamble in Kew Bull. 1915, 345. *A. laurifolia* var. 4; F. B. I. i. 498.

Anamalai Hills of Coimbatore (Barber); Pulneys (Wight).

7. *Chloroxylon*, DC.

A deciduous tree. *Leaves* pinnate; leaflets numerous, very oblique, entire, gland-dotted. *Flowers* small, in terminal and axillary pubescent panicles. *Calyx* short, 5-lobed. *Petals* 5, clawed, imbricate. *Disk* thick, 10-lobed, pubescent. *Stamens* 10, free, inserted between the lobes of the disk. *Ovary* pubescent, sunk in the disk, 3-lobed, 3-celled; style short, slender, glabrous; stigma capitate; ovules 8 in each cell. *Fruit* an oblong, 3-celled, loculicidal capsule. *Seeds* about 4 in each cell, imbricate, compressed, winged especially above, their margins angular, attached to the edges of the septa; albumen 0; cotyledons fleshy, flattened; radicle short.

CHLOROXYLON SWIETENIA, DC.; F. B. I. i, 569; W. & A. 123;

Wt. Ill. i. t. 56 *bis*; Bedd. Fl. t. 11. *Swietenia Chloroxylon*, Roxb. Cor. Pl. i. t. 64.

N. Circars (common and of large size) and Deccan in dry deciduous forests, less common in the Carnatic, usually on poor soil like laterite. Satin wood.

A conspicuous and pretty tree with rough yellowish corky bark and yellow close-grained wood valuable for furniture and turnery. Vern. *Hind.* Bhera; *Ur.* Bheru; *Tel.* Billu; *Tam.* Purush.

8. *Glycosmis*, Correa.

Unarmed shrubs or small trees. *Leaves* 1-foliate or imparipinnate; leaflets alternate. *Flowers* small, in axillary rarely terminal panicles. *Calyx* 4-5-lobed; lobes broad, imbricate. *Petals* 4-5, imbricate. *Stamens* 8-10, free, inserted round a disk; filaments flat; anthers small, usually with an apical or dorsal gland. *Ovary* seated on the disk, 2-5-celled; style short, persistent; stigma capitate; ovules 1 in each cell, pendulous. *Fruit* a dry or pulpy berry, 1-3-seeded. *Seeds* globose, usually depressed; testa membranous; albumen 0; cotyledons thick fleshy, hemispheric; embryo very small, villous.

GLYCOSMIS COCHINCHINENSIS, Pierre. *G. pentaphylla*, Correa; F. B. I. i. 499; W. & A. 93. *G. arborea*, DC.; W. & A. 92. *G. triphylla*, Wt. Ic. t. 167; W. & A. 93. *Limonia pentaphylla*, Roxb. Cor. Pl. i. t. 84. *L. arborea*, Roxb. l.c. t. 85.

In all Districts, common, especially as undergrowth of forests, of mango groves, and of hedgerows near villages.

Usually a shrub, occasionally a small tree, very variable in leaves, flowers and fruit. Leaves usually with 3-5 leaflets, but 1 only not rare, the leaflets often are large, up to 9 in. long, sometimes again they are quite small. Many varieties exist, but all are more or less connected by intermediates. Vern. *Hind.* Ban nimbu; *Tel.* Gonji; *Tam.* Kula pannai; *Mal.* Páanal.

9. *Micromelum*, Blume.

Unarmed trees. *Leaves* imparipinnate; leaflets alternate, oblique. *Flowers* in large terminal corymbose panicles. *Calyx* cupshaped, 3-5-lobed. *Petals* 5, free, thick, valvate or subimbricate. *Disk* short, stipitiform. *Stamens* 10, free, inserted at the base of the disk; filaments linear-subulate, alternately shorter

and longer. *Ovary* seated on the disk, 5-, rarely 2-6-celled; style thick, articulate, deciduous; stigma capitate or obtuse; ovules 2 in each cell, superposed. *Fruit* a 1-2-seeded berry; septa spirally twisted. *Seeds* oblong; testa membranous; albumen 0; cotyledons leafy, much crumpled; radicle long.

MICROMELUM PUBESCENS, Blume; F. B. I. i. 501.

N. Circars, Hills of Ganjam and Vizagapatam (Beddome, Barber).

A small tree with pinnate leaves up to 18 in. long and distant pinnules very unequal at base. Wood yellowish-white, hard and close-grained.

10. Clausena, Burm.

Unarmed shrubs or trees. *Leaves* imparipinnate; leaflets alternate, glandular-dotted, usually crenate. *Flowers* small, in terminal or axillary cymes panicles or compound racemes. *Calyx* 4-5-lobed. *Petals* 4-5, free, membranous, imbricate, gland-dotted. *Disk* elongated. *Stamens* 8-10, inserted round the disk; filaments dilated below the tip, alternately longer and shorter; anthers rather large, usually glandular on the back. *Ovary* 4-5- (rarely 2-3-) celled; style thick, articulate, deciduous; stigma obtuse, entire or lobed; ovules 2 in each cell, collateral or superposed. *Fruit* an oblong or globose berry, 2-5-celled, pericarp very glandular. *Seeds* oblong; testa membranous; albumen 0; cotyledons equal, plano-convex; embryo minute.

Ovary glabrous:—

Flowers usually 5-merous; ovary with conspicuous glandular papillae:—

Inflorescence terminal, paniculate with corymbose branches up to 5 in. long; leaflets membranous, rhomboid, oblique, nearly black when dry, with raised glands, reticulation obscure; ovules collateral

1. *indica*.

Inflorescence subterminal or axillary in thyrsoid panicles up to 8 in. long; leaflets chartaceous, lanceolate to obovate, yellowish when dry with immersed glands, reticulation conspicuous; margins often crenate; ovules superposed

2. *heptaphylla*.

Flowers 4-merous; inflorescence axillary, in slender compound racemes up to 4 in. long; leaflets membranous, ovate-lanceolate, oblique, greenish when dry and profusely glandular-dotted; ovary with obscure glands; ovules superposed.....

3. *Willdenovii*.

Ovary hirsute; leaves and inflorescence pustular; flowers 4-5-merous
Wampi.

1. *CLAUSENA INDICA*, Oliver; F. B. I. i. 505.

W. Ghâts, in evergreen forests of the Anamalais and Travancore at 3,000 to 5,000 ft., not common.

2. *CLAUSENA HEPTAPHYLLA*, W. & A. 95 (in note); F. B. I. i. 504.

N. Circars, Hills of Ganjam and Vizagapatam to 5,000 ft.; W. Ghâts in Wynaad, Malabar, Anamalais, Pulneys and Travancore at 3,000 to 5,000 ft.

A branching bush or small tree, strongly aromatic.

3. *CLAUSENA WILLDENOVII*, W. & A. 96; Wt. Ic. t. 14; F. B. I.

i. 506. *C. pubescens*, W. & A. 96.

Carnatic, in Chingleput, S. Arcot, Pudukota and Tanjore; Shevaroy Hills of Salem; W. Ghâts from Mysore through Nilgiris to Travancore at low levels.

A small tree with glabrous or pubescent leaves, black bark and white close-grained wood. The fruit is good and worth cultivation. Vern. *Tam.* Potti.

C. Wampi, Blanco, is a Chinese species cultivated for its orange-flavoured small fruit.

11. *Murraya*, Linn.

Shrubs or small trees, unarmed. *Leaves* pinnate; leaflets alternate, petiolulate, oblique or cuneate at base. *Flowers* solitary, axillary or in terminal corymbs or axillary cymes. *Calyx* 5-lobed. *Petals* 5, free, imbricate. *Disk* stipitiform. *Stamens* 10, inserted outside the disk; filaments linear-subulate, alternately shorter and longer; anthers small. *Ovary* seated on the disk, 2-5-celled; style elongate, articulate, deciduous; stigma capitate; ovules solitary or 2 superposed in each cell. *Fruit* a 1-2-celled berry, oblong or ovoid. *Seeds* with a woolly or glabrous testa; albumen 0; cotyledons thick, plano-convex; embryo small.

Flowers few, rather large, axillary; petals 5 in. long; leaflets 3-7; berry red1. *exotica*.
 Flowers many; in terminal corymbs; petals 2 in. long; leaflets 10-20; berry black2. *Königii*.

1. *MURRAYA EXOTICA*, Linn.; F. B. I. i. 502; W. & A. 94; Wt. Ic. t. 96.

In almost all Districts, especially in the hills; common in underwood and especially in ravines; often planted in gardens.

A large shrub or small tree with scented flowers. Wood very hard, resembling boxwood. Vern. *Hind.* Marchula; *Tel.* Naga golunga.

2. MURRAYA KÖNIGII, Spreng.; F. B. I. i. 503. *Bergera Königii*, Linn.; W. & A. 94; Wt. Ic. t. 13.

In most Districts, chiefly in the N. Circars and Deccan, less frequent on the W. Coast, but nowhere very common. A small tree with very aromatic leaves which are eaten in curries. Wood greyish-white, softer than that of the last. Vern. *Hind.* Katnīm; *Tel.* Karepaku; *Tam.* Karivempu, Kátta veppilei; *Kan.* Kari bévu.

12. *Triphasia*, Lour.

A shrub, armed with strong straight spines. *Leaves* alternate, sessile, 3-foliolate; leaflets small, obtuse, crenate, the lateral ones smaller than the terminal. *Flowers* solitary or in 2-3-flowered cymes, axillary, sweet-scented. *Calyx* 3-lobed. *Petals* 3, free, imbricate, oblong. *Disk* fleshy. *Stamens* 6, free, inserted round the disk; filaments long, subulate, dilated below; anthers oblong. *Ovary* seated on the disk, ovoid-oblong, narrowed into the articulate style; stigma capitate, 3-lobed; cells 3; ovules 1 in each cell. *Fruit* an ovoid fleshy gland-dotted berry 1-3-celled and -seeded. *Seeds* ovoid-oblong, immersed in mucilage; testa coriaceous; albumen 0; cotyledons flattened, plano-convex, often unequal or lobed; embryo minute.

TRIPHASIA AURANTIOLA, Lour. *T. trifoliata*, DC.; F. B. I. i. 507; W. & A. 91.

Cultivated and found run wild as at Madras and Cochin; apparently introduced from China.

13. *Limonia*, Linn.

Shrubs or small trees, often armed with spines. *Leaves* alternate, 3-foliolate or imparipinnate with usually opposite leaflets; petiole and rhachis winged. *Flowers* in fascicles racemes or panicles. *Calyx* 4-5-lobed or -partite. *Petals* 4-5, imbricate. *Disk* annular or stipitiform. *Stamens* 8-10, free, subequal, inserted round the disk; filaments subulate; anthers cordate or

linear-oblong. *Ovary* oblong, 4-5-celled; style short, thick, articulate; stigma obtuse or capitate; ovules 1-2 in each cell. *Fruit* a globose 1-4-celled and -seeded berry. *Seeds* ovoid or flattened, imbedded in mucilage; albumen 0; cotyledons fleshy, plano-convex.

Leaves trifoliolate; leaflets obovate, entire, cuneate at base, up to 2·5 in. long; flowers 4-5-merous, in terminal or axillary panicles; ovary cells 2-ovuled; berry 1 in. in diam.1. *alata*.

Leaves imparipinnate; leaflets 2-4 pair, sessile, opposite, crenulate, up to 2 in. long, rhachis broadly winged; flowers 4-merous, in racemes 1 in. long; ovary cells 1-ovuled; berry under ·5 in. in diam. ...2. *crenulata*.

1. LIMONIA ALATA, W. & A. 92; Wt. Ill. i. 41; F. B. I. i. 508.

Deccan and Carnatic from the Kistna southwards, in evergreen forests; E. side of W. Gháts at the foot of the hills from Coimbatore to Tinnevely.

A shrub or small tree, scarce. Wood hard and close-grained.

2. LIMONIA CRENULATA, Roxb., Cor. Pl. i. t. 86. *L. acidissima*, W. & A. 92; F. B. I. i. 507, *not of* Linn.

N. Circars, Deccan and Carnatic, common in dry forests.

A small thorny tree, in favourable places reaching a good size. Wood yellowish-white, very hard, like boxwood.

Vern. *Hind.* Beli; *Ur.* Bhenta; *Tel.* Tor-elaga.

14. Luvunga, Ham.

Climbing shrubs, armed with axillary spines. *Leaves* 3-foliate; leaflets coriaceous, entire. *Flowers* in axillary fascicled racemes or panicles. *Calyx* cupular, entire or obscurely 4-6-lobed. *Petals* 4-5, free, thick, imbricate. *Disk* elevated, annular or cupular. *Stamens* 8-10, inserted round the disk; filaments free, equal or subequal, linear; anthers linear or linear-oblong. *Ovary* 2-4-celled; style stout, articulate, deciduous; stigma capitate; ovules 2 in each cell, superposed. *Fruit* a large ellipsoid berry, 1-3-seeded, rind thick. *Seeds* large, ovoid; testa membranous; albumen 0; cotyledons oblong, fleshy.

LUVUNGA ELEUTHERANDRA, Dalz.; F. B. I. i. 509.

A climber with strong sharp usually deflexed spines, thick leaflets, 4-merous flowers and large fruit pitted with glands.

W. Gháts from S. Canara and Mysore to Anamalais and Travancore up to 3,000 ft., in evergreen forests.

15. *Paramignya*, Wight.

Shrubs, erect or climbing, unarmed or with axillary spines. *Leaves* 1-foliolate, entire, subcoriaceous. *Flowers* rather large, axillary, solitary or fascicled. *Calyx* cupular or small and 4-5-lobed. *Petals* 4-5, free, imbricate or rarely valvate. *Disk* thick, columnar. *Stamens* 8-10, free; filaments linear, equal or subequal, inserted round the disk, usually hairy; anthers linear-oblong. *Ovary* 3-5-celled; style elongate, articulate, deciduous; stigma capitate; ovules in each cell 1 or 2 obliquely superposed. *Fruit* an ovoid or subglobose berry, often contracted at base; 1-5-seeded; rind thick. *Seeds* large, oblong, compressed; testa membranous; cotyledons fleshy, equal.

Leaflets ovate-oblong or elliptic, obtuse or acute at apex, rounded at base, 2-5 in. long, 1-2 in. broad; calyx 5-lobed, pubescent; pedicels rather stout:—

Calyx cupular with broad lobes; petals thick, very imbricate, .4-.5 in. long1. *monophylla*.

Calyx small with acute lobes; petals thin, induplicate-valvate, .3 in. long2. *Griffithii*.

Leaflets ovate or ovate-lanceolate, acuminate at apex, rounded at base, 2-3 in. long, 1-1.5 in. broad; calyx with 4 minute teeth, glabrous; pedicels long slender3. *armata*.

1. *PARAMIGNYA MONOPHYLLA*, Wt. Ill. i. 109, t. 42; F. B. I. i. 510.

N. Circars, Hills of Ganjam, Rumpa Hills up to 3,000 ft. or more; W. Gháts from S. Canara to Tinnevely up to 6,000 ft., thorny climber.

2. *PARAMIGNYA GRIFFITHII*, Hook. f.; F. B. I. i. 510.

E. Gháts in Madgol Hills of Vizagapatam 4,000 ft. (A. W. Lushington), thorny climber.

3. *PARAMIGNYA ARMATA*, Oliv.; F. B. I. i. 511; Bedd. Ic. t. 275.

W. Gháts in Wynaad, Atapadi Hills of Malabar, Hills of Tinnevely, thorny climber.

16. *Atalantia*, Correa.

Evergreen shrubs or trees, armed or unarmed. *Leaves* alternate, 1-foliolate; leaflet coriaceous, entire or crenulate; stipule-like scales often present, representing undeveloped leaf-buds. *Flowers* in axillary, rarely terminal, fascicles racemes or panicles, rarely

solitary. *Calyx* 3-5-lobed or -partite, sometimes irregularly split. *Petals* 3-5, free or adnate to the stamens and united with them in a tube, imbricate. *Disk* annular or cupular. *Stamens* 6-8 (rarely 15-20) inserted outside the disk; filaments free or connate in a tube, subequal or the alternate shorter; anthers short, ovate-oblong or cordate (linear-oblong in *A. missionis*). *Ovary* 2-4- (rarely 3-5-) celled; style stout, articulate, deciduous; stigma capitate; ovules 1 or 2 in each cell, if 2 collateral. *Fruit* a large subglobose berry with thick rind, 1-5-celled and -seeded. *Seeds* ovoid or oblong; testa membranous; albumen 0; cotyledons fleshy, plano-convex, sometimes unequal.

Stamens usually combined in a tube; leaflet emarginate:—

Calyx irregularly lobed; flowers in umbels or corymbs; leaflet ovate, obtuse, 1-3 in. long.....1. *monophylla*.

Calyx regularly lobed; flowers in racemes; leaflet elliptic, obtusely acute, 2-4 in. long2. *racemosa*.

Stamens free:—

Leaves with conspicuous reticulation and prominent parallel main nerves (12-14 pairs) olive-green when dry, emarginate; filaments flat, anthers cordate; flowers in short cymes3. *ceylanica*.

Leaves with inconspicuous reticulation and main nerves (8-10 pairs), dull greyish-brown when dry, not emarginate; filaments dilated below only; anthers linear-oblong; flowers in racemes, 1-2 in. long.

4. *missionis*.

1. *ATALANTIA MONOPHYLLA*, Correa; F. B. I. i. 511; W. & A. 91. *A. floribunda*, Wt. Ic. t. 1611. *Limonia monophylla*, Linn.; Roxb. Cor. Pl. i. t. 82.

N. Circars, Deccan and Carnatic in dry forests in almost all Districts; W. Coast and W. Ghâts, scarce.

A small thorny tree with yellowish very hard close-grained wood, of boxwood character. Vern. *Ur. Kata narunga*; *Tel. Yerra munukudu*; *Tam. Katta naragam*.

2. *ATALANTIA RACEMOSA*, W. & A. 91; F. B. I. i. 512. *Sclerostylis parvifolia*, Wt. Ic. t. 71.

Hills of the Deccan, Nandidrúg in Mysore, Horsley Konda in Cuddapah, etc., up to 4,000 ft.; W. Ghâts, chiefly on eastern side from Mysore to Travancore, up to 3,000 ft.

A small thorny tree, resembling No. 1, but with shorter staminal tube and leaves often crenulate. Vern. *Tam. Katta naragam*.

3. *ATALANTIA CEYLANICA*, Oliv. ; F. B. I. i. 512.

W. Gháts in Wynaad, Malabar, Nilgiris, Anamalais and Travancore, up to 5,000 ft.

A small thorny tree or branching shrub, not common.

4. *ATALANTIA MISSIONIS*, Oliv. ; F. B. I. i. 513. *Limonia missionis*, Wt. Ic. t. 175 ; W. & A. 92.

Deccan Hills in Chingleput, Cuddapah, etc. ; also E. slopes of Nilgiris and Anamalais ; W. Coast, Quilon in Travancore.

A small very thorny *Citrus*-like tree with yellowish-white hard wood. Vern. *Tam.* Kuruntu.

17. *Feronia*, Gaertn.

A tree, armed with spines. *Leaves* alternate, imparipinnate ; leaflets opposite, subsessile, entire ; petiole and rhachis winged or not. *Flowers* polygamous, in terminal or lateral racemes or panicles. *Calyx* small, flat, 5-toothed, deciduous. *Petals* 5, rarely 4 or 6, imbricate, spreading. *Disk* short. *Stamens* 10–12, a few sometimes imperfect, inserted round the disk ; filaments dilated below, villous on face and margins, slender above ; anthers linear-oblong. *Ovary* oblong, 5–6-celled, at length 1-celled ; style 0 ; stigma oblong, fusiform, deciduous ; ovules numerous, many-seriate, crowded on the at length parietal placentas. *Fruit* a large, globose, 1-celled, many-seeded berry with rough woody rind. *Seeds* oblong, compressed, imbedded in pulp ; albumen 0 ; cotyledons thick, fleshy.

FERONIA ELEPHANTUM, Corr. ; F. B. I. i. 516 ; W. & A. 96 ; Wt. Ic. t. 15 ; Roxb. Cor. Pl. ii. t. 141 ; Bedd. Fl. t. 121.

N. Circars, Deccan and Carnatic, in dry open forests, often cultivated both there and on W. Coast. The Wood-apple.

A small deciduous spiny tree with yellowish-white hard wood. The pulp of the fruit is much eaten. Vern. *Hind.* Kat-bél ; *Ur.* Koito ; *Tel.* Velaga ; *Tam.*, *Mal.* Vila, Vilatti ; *Kan.* Bilwar.

18. *Aegle*, Corr.

Trees, armed with spines. *Leaves* alternate, 3-foliolate ; leaflets membranous, subcrenulate, glabrous or pubescent. *Flowers* hermaphrodite, rather large, white, in axillary panicles. *Calyx* small, 4–5-lobed, deciduous. *Petals* 4–5, oblong, imbricate, spreading. *Disk* inconspicuous. *Stamens* numerous (30–60) inserted round the disk ; filaments subulate ; anthers elongate, erect. *Ovary* ovoid,

8-20-celled, the cells peripheral round a thick axis ; style short ; stigma oblong, fusiform, deciduous ; ovules numerous, 2-seriate in each cell. *Fruit* a large, globose or ovoid, 8-15-celled, berry, the cells many-seeded, the rind smooth, woody. *Seeds* numerous, imbedded in aromatic pulp, oblong, compressed ; albumen 0 ; cotyledons thick, fleshy.

AEGLE MARMELOS, Corr. ; F. B. I. i. 516 ; W. & A. 96 ; Wt. Ic. t. 16 ; Roxb. Cor. Pl. ii. t. 143 ; Bedd. Fl. t. 161.

N. Circars, Deccan and Carnatic, in dry forests ; W. Coast, run wild ; often cultivated. The Bael tree.

A small deciduous thorny tree, the leaves usually glabrous, but grey-pubescent in the more arid localities. Wood yellowish-white, hard. The fruit is valued for its aromatic pulp and its medicinal use. Vern. *Hind.* Bél ; *Ur.* Baelo ; *Tel.* Maredu ; *Tam.* Vilva ; *Mal.* Kovalam.

19. Citrus, Linn.

Evergreen shrubs or trees, usually armed with spines. *Leaves* alternate, 1-foliolate, coriaceous ; petiole often winged ; leaflets entire or crenulate ; stipules 0. *Flowers* axillary, solitary fascicled or in small cymes. *Calyx* cupular or urceolate, 3-5-lobed. *Petals* 4-8, linear-oblong, thick, imbricate. *Disk* large, cupular or annular. *Stamens* numerous (20-60), inserted round the disk ; filaments irregularly polyadelphous, compressed at the base ; anthers oblong. *Ovary* many-celled ; style stout, deciduous ; stigma capitate ; ovules 4-8 in each cell, 2-seriate. *Fruit* a large berry, oblong or globose, fleshy, many-celled ; septa membranous ; cells few-seeded and filled with transverse fusiform cells filled with juice, the rind leathery. *Seeds* horizontal or pendulous ; testa coriaceous or membranous ; albumen 0 ; cotyledons plano-convex, often unequal ; radicle small, superior.

CITRUS MEDICA, Linn. ; F. B. I. i. 514.

N. Circars, in Ganjam and Vizagapatam up to 3,000 ft., usually in thickets along streams ; W. Gháts of Coorg, Malabar, Nilgiris and N. Travancore up to 4,000 ft.

A small tree with elliptic-oblong obtuse crenulate leaflets, apparently quite wild. There are 4 cultivated varieties of this species : (1) *medica* proper, the Citron ; (2) *Limonum*, the Lemon ; (3) *acida*, the sour Lime ; and (4) *Limetta*, the sweet Lime.

Citrus Aurantium, Linn., the Orange, and *C. decumana*, Linn., the Pumelo, or Shaddock, are also much cultivated, the former frequently found run wild.

Family XXXV. SIMARUBACEAE.

Trees or shrubs, usually with bitter bark and sometimes wood. *Leaves* alternate, pinnate, rarely simple; stipules 0 or deciduous. *Flowers* regular, small, 1-sexual or polygamous rarely hermaphrodite, in axillary cymes racemes or panicles. *Calyx* 3-5-lobed. *Petals* 3-5, rarely 0, valvate or imbricate. *Disk* annular or elongated, simple or lobed, rarely 0. *Stamens* as many as or twice as many as the petals, rarely indefinite, inserted at the base of the disk; filaments free, often with a scale at the base; anthers oblong, usually introrse, dehiscing longitudinally. *Ovary* free, 1-6-celled, usually deeply lobed; styles 2-5, free or united; stigmas capitate plumose or minute; ovules usually 1 in each cell. *Fruit* usually of 2-6 distinct carpels, sometimes samaroid sometimes indehiscent drupaceous. *Seeds* usually solitary, erect or pendulous; albumen fleshy scanty or 0; cotyledons plano-convex or flat; radicle superior.

Ovary deeply divided:—

Leaves pinnate; fruit samaroid; large trees1. **Ailanthus**.

Leaves simple; fruit drupaceous, winged, small trees...2. **Samadera**.
Ovary entire; leaves 2-foliolate, small; flowers small, green, fruit a large one-seeded drupe; small thorny trees3. **Balanites**.

1. *Ailanthus*, Desf.

Tall trees. *Leaves* very large, alternate, imparipinnate; leaflets alternate or subopposite, unequal-sided. *Flowers* small, polygamous, in terminal or axillary branched panicles, bracteolate. *Calyx* short, 5-lobed. *Petals* 5-6, valvate. *Disk* 10-lobed. *Stamens* in ♂ flowers 10-12, in ♀ fewer, in ♀ wanting, inserted at the base of the disk; filaments short or filiform; anthers ovate or oblong, introrsely or laterally dehiscing. *Ovary* in ♂ rudimentary, in others 2-5-celled, the carpels compressed, more or less distinct; styles from below the apex, connate above; stigmas plumose; ovule 1 in each cell, semianatropous. *Fruit* of 1-5, single-seeded, oblong samaras with large membranous wings. *Seed* pendulous, compressed; testa membranous; albumen very scanty or 0; cotyledons flat, fleshy; radicle small, superior.

Leaflets coarsely toothed, very tomentose when young; petals usually reflexed; filaments shorter than the oblong anthers; samara narrow, twisted1. *excelsa*.
 Leaflets entire, glabrous; petals erect; filaments longer than the ovate cordate anthers; samara broad, not twisted2. *malabarica*.

1. *AILANTHUS EXCELSA*, Roxb. Cor. Pl. i. 24, t. 23; F. B. I. i. 518; W. & A. 150; Wt. Ill i. t. 67.

N. Circars, forests of Ganjam and Vizagapatam; scarce in Deccan and Carnatic; often planted.

A beautiful tree with rough bark and soft white wood, used for catamarans and sword-sheaths. Vern. *Hind*. Maharukh; *Ur*. Mahanim; *Tel*. Peddamán; *Tam*. Peru.

2. *AILANTHUS MALABARICA*, DC.; F. B. I. i. 518; W. & A. 150; Wt. Ic. t. 1604; Bedd. Fl. t. 122.

W. Gháts from S. Canara and Mysore to Travancore, up to 3,000 ft., often planted.

A lofty deciduous tree with grey rough bark and soft white wood. Vern. *Kan*. Dhúp; *Tam*. Peru; *Mal*. Pongilyam, Mattipál.

2. *Samadera*, Gaertn.

Small glabrous trees. *Leaves* alternate, simple, oblong, coriaceous, shining, with 2 glands at the base. *Flowers* hermaphrodite, in axillary or terminal long-peduncled umbels. *Calyx* small, 3-5-lobed, imbricate. *Petals* 3-5, coriaceous, elongate, imbricate. *Disk* large, obconic. *Stamens* 6-10, with short basal scales; filaments slender, twisted; anthers oblong. *Ovary* of 4-5 distinct free carpels; styles free at the base, more or less united above; stigmas acute; ovule 1 in each cell, pendulous. *Fruit* of 1-5 large dry compressed drupes with a narrow wing. *Seed* solitary; testa membranous; cotyledons plano-convex, fleshy; radicle very short.

SAMADERA INDICA, Gaertn.; F. B. I. i. 519; W. & A. 151; Wt. Ill. t. 68.

W. Coast in evergreen forests and along backwaters in Malabar and Travancore.

A small tree with elliptic-oblong shining leaves reaching 10 in. by 3-4 in., large smooth red fruit and light yellow soft bitter-tasting wood. Vern. *Mal*. Karingotta.

3. *Balanites*, Delile.

Small trees or shrubs armed with strong sharp spines, often ending arrested branchlets. *Leaves* alternate, 2-foliolate; leaflets entire. *Flowers* small, green, fragrant, in axillary cymes. *Sepals* 5, imbricate, deciduous. *Petals* 5, oblong, spreading, imbricate. *Disk* thick, conical, 10-grooved, hollowed at the apex. *Stamens* 10, inserted in the furrows at the base of the disk; filaments slender, subulate; anthers inserted at the back. *Ovary* entire, globose, 1-celled; style short; stigmas minute; ovules 1 in each cell, pendulous from below the apex. *Fruit* a large fleshy oily 1-seeded drupe; putamen bony, 5-angled, 1-seeded. *Seed* pendulous; testa fibrous; albumen 0; cotyledons thick, oblong, plano-convex; radicle superior.

BALANITES ROXBURGHII, Planch.; F. B. I. i. 522. *B. aegyptiaca*, Wt. Ic. t. 274.

N. Circars in Vizagapatam; Deccan, common in Hyderabad, Ceded Districts and Mysore, in dry forests, characteristic also of black-cotton soils.

A small tree with ashy-grey foliage, grey bark and yellowish-white wood of peculiar structure. Vern. *Hind.* Hingu; *Tel.* Gari; *Tam.* Nanjunda.

Family XXXVI. OCHNACEAE.

Trees or shrubs. *Leaves* alternate, glabrous, simple or rarely pinnate; stipules 2. *Flowers* regular, hermaphrodite, conspicuous, in racemes panicles or umbels rarely solitary, terminal axillary or on short lateral branchlets. *Sepals* 4-5, free, imbricate, persistent. *Petals* 5, rarely 4-10, free, deciduous, imbricate. *Disk* thick, enlarged in fruit, sometimes 0. *Stamens* 4, 5, 8, 10 or indefinite, inserted at the base of the disk; anthers dehiscing longitudinally or by terminal pores. *Ovary* short and 2-celled or elongate and 1-10-celled; placentas axile or parietal; styles simple, subulate, straight or incurved; stigmas terminal; ovules 1-2 in each cell or indefinite, erect or rarely pendulous. *Fruit* indehiscent, drupaceous or baccate, each drupe or pyrene 1-4-seeded, or capsular and 1-5-celled with septicidal dehiscence. *Seeds* solitary or few, rarely numerous; albumen fleshy or 0; embryo usually straight.

Stamens indefinite anthers opening longitudinally1. *Ochna*.
Stamens 10, anthers opening by terminal pores.....2. *Ouratea*.

1. *Ochna*, Linn.

Trees or shrubs, glabrous. *Leaves* alternate, simple, usually serrate or crenate, shining, many-nerved; stipules 2. *Flowers* conspicuous, yellow, bracteate, in racemes panicles or umbels, from the ends of short woody branches. *Sepals* 5 imbricate, persistent, coloured. *Petals* 5-10, imbricate, deciduous. *Disk* thick, lobed. *Stamens* numerous, shorter than the petals, inserted at the base of the disk; filaments persistent; anthers linear, dehiscing longitudinally, deciduous. *Ovary* deeply 3-10-lobed, lobes 1-celled; styles basal, connate or sometimes free at the apex; stigmas simple or capitate; ovule 1 in each cell, axile. *Fruit* of 3-10 distinct drupes seated on the enlarged disk. *Seed* erect, oblong; testa membranous; albumen 0; cotyledons thick, plano-convex; radicle minute.

Flowers large :—

Flowers in axillary or lateral racemes; trees :—

Leaves closely nerved, serrate or shortly crenate :—

Leaves membranous or chartaceous, green, lanceolate or obovate, acute at apex, shortly petioled, distant on the branchlets not tufted; stigmas simple, minute1. *squarrosa*.

Leaves coriaceous, glaucous, obovate, obtuse at apex, cordate at base, nearly or quite sessile; tufted at the ends of the branchlets; stigmas in a lobed head2. *Gamblei*.

Leaves coarsely and irregularly nerved, broadly crenate, oblong or obovate-oblong, obtuse at apex; pedicels long, slender; stigmas minute3. *Beddomei*.

Flowers in subterminal umbels; dwarf shrubs with oblanceolate coarsely-nerved leaves up to 6 in. long; styles free at apex 4. *pumila*.

Flowers small, solitary or in racemes of 2-3 flowers, axillary or lateral; leaves subcoriaceous :—

Leaves elliptic or ovate, obtuse, subcordate, with conspicuous close nerves, under 1·5 in. long; styles scarcely free at apex; stigmas minute.....5. *Wightiana*.

Leaves oblong-lanceolate, acute at both ends, with inconspicuous nerves, 2-3 in. long; styles free at apex with peltate stigmas

6. *Heyneana*.

1. *OCHNA SQUARROSA*, Linn.; F. B. I. i. 523; Roxb. Cor. Pl. i. t. 89; Wt. Ill. i. t. 69.

N. Circars, common in Ganjam and Vizagapatam; Deccan

and Carnatic, less common, but widespread from Hyderabad to Tinnevely in fairly damp places.

A small tree with thin brown bark and reddish-brown wood of pretty grain, conspicuous for its yellow flowers with persistent sepals. Vern. *Tel.* Sunari; *Tam.* Chilanti; *Kan.* Narole.

2. *OCHNA GAMBLEI*, King; Brandis Ind. Trees 128.

Deccan and Carnatic, in dry places and on rocky hills in Hyderabad, the Ceded Districts and Hills of Chingleput; W. Coast at Quilon in Travancore (*Wight*—small-leaved var.).

A small tree with thick bark and reddish wood, conspicuous for its tufted very glaucous leaves and large yellow flowers. Vern. *Tel.* Kuka-moi.

3. *OCHNA BEDDOMEI*, Gamble in Kew Bull. 1916, ined.

Forests of Kurnool Cuddapah and Mysore, apparently scarce; perhaps also in N. Circars.

A small tree (?), but little known.

4. *OCHNA PUMILA*, Ham.; F. B. I. i. 524.

Madras Presidency (Beddome), perhaps S. Canara.

A dwarf undershrub with perennial rootstock, throwing up annually, usually after jungle fires, shoots with large bright yellow flowers.

5. *OCHNA WIGHTIANA*, Wall.; Wt. Ic. t. 220 (*as to description only except stigma*); W. & A. 152; F. B. I. i. 524, *in part*. Travancore (*Wight*); Dimbham Ghát, Coimbatore (A. W. Lushington).

A shrub or small tree with small coriaceous leaves and small flowers in racemes of 1-3 together.

6. *OCHNA HEYNEANA*, W. & A. 152. *O. Wightiana*, Wt. Ic. t. 223 (*plate only*).

W. Gháts, Hills of Tinnevely and Travancore.

A small tree with oblong-lanceolate leaves and small flowers. Vern. *Tam.* Silimbi.

2. *Ouratea*, Aubl.

Small trees, glabrous. *Leaves* alternate, simple, coriaceous, shining, many-nerved, finely serrate; stipules 2. *Flowers* yellow, in axillary or terminal racemes or umbels. *Sepals* 5, usually coloured, persistent. *Petals* 5, imbricate. *Disk* thick, lobed.

Stamens 10, inserted at the base of the disk; filaments very short; anthers linear, dehiscing by terminal extrorse pores. *Ovary* deeply 5-6-lobed, lobes 1-celled; styles basal, connate; stigmas simple; ovule 1 in each cell, erect. *Fruit* of 5 or fewer distinct drupes seated on the enlarged disk. *Seed* erect; testa membranous; albumen 0; cotyledons fleshy, plano-convex; radicle very short.

OURATEA ANGUSTIFOLIA, Gilg. *Gomphia angustifolia*, Vahl; F. B. I. i. 525; W. & A. 152.

W. Coast and lower slopes of W. Gháts from S. Canara to Tinnevely, up to 3,000 ft., in evergreen forests.

A small tree with shining leaves and an intramarginal nerve; drupes reniform, reticulate; wood reddish-brown, even-grained, hard. Vern. *Tam.* Ramanchi; *Mal.* Chavakampu.

Family XXXVII. BURSERACEAE.

Trees or shrubs with balsaminous juice. *Leaves* alternate, very rarely opposite, imparipinnate, 3-foliolate or rarely 1-foliolate, exstipulate or rarely stipulate. *Flowers* regular, hermaphrodite or polygamous, usually small, in racemes or panicles. *Calyx* 3-6-lobed, imbricate or valvate. *Petals* 3-6, free or rarely connate, imbricate or valvate. *Disk* annular or cupular, free or adnate to the calyx-tube. *Stamens* as many as or twice as many as the petals, inserted below or on the disk; filaments free, rarely connate; anthers 2-celled, dehiscing longitudinally. *Ovary* free, 2-5-rarely 1-celled; style simple; stigma undivided or 2-5-lobed; ovules 2, rarely 1 in each cell, axile, usually pendulous. *Fruit* drupaceous, indehiscent with 2-5 pyrenes or dehiscent and pseudo-capsular. *Seeds* solitary, pendulous; testa membranous; albumen 0; embryo with membranous usually contortuplicate cotyledons; radicle superior.

Drupe dehiscent valvately, trigonous, the pyrenes separating; seeds compressed, winged1. **Boswellia.**

Drupe indehiscent, globose or ovoid.

Disk cupshaped:—

Disk adnate to the calyx; pyrenes 1-5, bony, pitted, 1-seeded

2. **Garuga.**

Disk free; pyrenes combined, one only seed-bearing

3. **Commiphora.**

Disk annular, usually lobed :—

Petals valvate ; pyrenes 1–3, free, covered with arilliform pulp

4. **Protium.**

Petals usually imbricate ; pyrenes 1–3, combined, without pulp

5. **Canarium.**

1. **Boswellia**, Roxb.

Trees with papery bark. *Leaves* deciduous, alternate, imparipinnate, crowded at the ends of the branches ; leaflets opposite, usually more or less crenate or serrate ; stipules 0. *Flowers* hermaphrodite, small, white or pink, in axillary racemes or panicles. *Calyx* small, 5-lobed, persistent. *Petals* 5, distinct, imbricate. *Disk* annular, fleshy, crenate. *Stamens* 10, alternately long and short, inserted on or outside under the disk ; filaments subulate ; anthers oblong or ovate. *Ovary* sessile, 3-celled ; style short ; stigma 3-lobed ; ovules 2 in each cell, collateral, pendulous. *Fruit* a trigonous drupe containing 3 pyrenes, valves septicidal ; pyrenes 1-seeded, bony, cordate with a long apex, surrounded by a broad membranous wing. *Seeds* compressed, pendulous ; testa membranous ; cotyledons multifid, contortuplicate.

Leaflets deeply broadly crenate, oblong-lanceolate, pubescent ; racemes usually paniced ; drupes ovoid1. *serrata*.

Leaflets entire or shallow-crenate, lanceolate, obtuse, glabrous or only puberulous on the nerves ; racemes usually simple ; drupes oblong-obovoid

2. *glabra*.

1. **BOSWELLIA SERRATA**, Roxb. ; F. B. I. i. 528, *excl. var. glabra*.

B. thurifera, Colebr. ; W. & A. 174.

Deccan, in Hyderabad, perhaps also Bellary, common in N. and C. India.

A large tree of dry rocky places, with ash-coloured bark of papyraceous texture, conspicuous especially in the hot season. Vern. *Hind.* Salai.

2. **BOSWELLIA GLABRA**, Roxb. ; Roxb. Cor. Pl. iii. t. 207 ; W. & A. 174 ; Bedd. Fl. t. 174. *B. serrata*, Roxb. var. *glabra*, F. B. I. i. 528.

Deccan and Carnatic from the Godavari to Mysore, in dry forests on poor rocky soil.

A large and conspicuous tree, with yellowish bark which exfoliates in thin flakes, and moderately hard white or brownish wood. It gives a fragrant gum-resin. Vern. *Tam.* Kungli, Gugulu ; *Tel.* Anduga ; *Kan.* Chitta.

2. *Garuga*, Roxb.

Large trees. *Leaves* alternate, imparipinnate, crowded at the ends of the branches; leaflets opposite, subsessile, crenate; stipules 0. *Flowers* polygamous, in much-branched panicles. *Calyx* campanulate, 5-lobed, valvate. *Petals* 5, inserted on the tube of the calyx, outside the disk. *Disk* thin, crenate at the margin, lining the tube of the calyx. *Stamens* 10, equal or alternately long and short, inserted with the petals; filaments subulate; anthers oblong. *Ovary* ovoid, 4-5-celled; style erect; stigma capitate, 4-5 lobed; ovules 2 in each cell, collateral. *Fruit* a globose fleshy drupe, with 1-5 bony pitted pyrenes, each 1-seeded. *Seed* with membranous or crustaceous testa; cotyledons thin, twice divided into narrow linear lobes, contortuplicate.

Panicles crowded, short-peduncled, under 6 in. long; calyx-tube long, deciduous; ovary villous; drupe large, .5 in. or more in diam.; leaflets usually tomentose, at any rate when young, crenatures short...1. *pinnata*. Panicles slender, few, long-peduncled, often 9 in. long; calyx-tube short, persistent; ovary glabrous; drupe small, .25 in. in diam.; leaflets glabrous, crenatures broad.....2. *Gamblei*.

1. *GARUGA PINNATA*, Roxb.; Cor. Pl. iii. t. 208; F. B. I. i. 528; W. & A. 175; Wt. Ic. tt. 1594, 1595; Bedd. Fl. t. 118; Brand. For. Fl. t. 13.

N. Circars, in the forests of Ganjam and Vizagapatam; Deccan from Hyderabad to Mysore, in deciduous forests; W. Gháts in S. Canara, Malabar and Coimbatore.

A large tree with thick bark and reddish-brown moderately hard wood of fair quality. The fruit is edible. Vern. *Hind.* Kharput; *Ur.* Sompotri; *Tel.* Garuga; *Tam.* Karre vemba.

2. *GARUGA GAMBLEI*, King; W. W. Smith in Rec. Bot. Surv. Ind. iv. 262.

W. Gháts in Malabar and Nilgiris, up to about 5,000 ft. (Wight, Gardner), Coonoor and Sigúr Gháts (Lawson).

A large tree, easily recognized by its long inflorescence and small fruits.

3. *Commiphora*, Jacq.

Trees or shrubs; branches often spinescent. *Leaves* alternate, 3-foliate or imparipinnate; leaflets sessile or shortly petioluled,

entire crenate or serrate, lateral ones often small; stipules 0. *Flowers* polygamous, small, fascicled or in paniculate dichasia. *Calyx* cupular urceolate or tubular, 4- rarely 5-6-lobed, valvate, persistent. *Petals* 4, rarely 5-6, inserted on or under the margin of the disk. *Disk* cupshaped. *Stamens* 8-10, inserted on or under the margin of the disk, alternately long and short; filaments subulate or filiform, sometimes dilated at base; anthers ovate or oblong, dehiscing longitudinally. *Ovary* ovoid, sessile, 2-4-celled; style short; stigma 3-4-lobed; ovules 2 in each cell, collateral. *Fruit* an ovoid or subglobose fleshy drupe, 2-6-valved; pyrenes crustaceous or bony, one only seed-bearing. *Seed* with membranous testa; cotyledons contortuplicate, very thin.

Armed; flowers few, in fascicles or solitary, leaves small, 3-foliolate, the side leaflets smaller than the end one:—

Calyx-lobes as long as the tube, glandular; leaflets 1-3, dentate above, obovate; branches ending in a sharp spine.....1. *Mukul*.
Calyx-lobes shorter than the tube, glabrous; leaflets 3, entire or broadly crenate, obtuse; many branchlets, all ending in sharp spines

2. *Berryi*.

Unarmed; flowers many, in long-peduncled paniculate dichasia up to 5 in. long; leaves imparipinnate with 2-5 pairs of leaflets, the side ones not much smaller than the end one:—

Leaflets glabrous, ovate or orbicular, acute or long-acuminate, usually abruptly, the end one long-petioled; calyx-tube glabrous without

3. *caudata*.

Leaflets pubescent, ovate or obovate, shortly acuminate, the end one subsessile; calyx-tube pubescent without4. *pubescens*.

1. COMMIPHORA MUKUL, Engl. *Balsamodendron Mukul*, Hook.; F. B. I. i. 529.

Bellary and Mysore (Wight).

A small tree or shrub, with greenish-yellow bark and soft white wood. The gum is used in medicine.

2. COMMIPHORA BERRYI, Engl. *Balsamodendron Berryi*, Arn.; F. B. I. i. 529; Bedd. Fl. t. 126. *Protium gileadense*, W. & A. 177.

Dry forests of the N. Coimbatore Hills, planted to make hedges from thence southwards in the Carnatic; Tinnevely District (Barber).

A good-sized tree (Beddome) with many sharp spines. It gives a gum-resin.

3. *COMMIPHORA CAUDATA*, Engl. *Protium caudatum*, W. & A. 176; F. B. I. i. 530; Bedd. Fl. t. 125.

Dry forests of the Deccan and Carnatic in Bellary, Cuddapah, Mysore, S. Arcot, rare in Travancore and Coimbatore. A deciduous tree with papery bark and greyish soft wood. Vern. *Tel.* Konda mamidi; *Kan.* Konda māvu; *Tam.* Kiluvai.

4. *COMMIPHORA PUBESCENS*, Engl. *Protium pubescens*, W. & A. 176; F. B. I. i. 530.

W. Ghāts, in the Anamalai Hills (Beddome).
A middling-sized tree.

4. *Protium*, Burm.

Trees. *Leaves* alternate, imparipinnate, rarely 1-foliate; leaflets opposite, petiolulate; stipules 0. *Flowers* small, hermaphrodite or polygamous, in short branched panicles. *Calyx* small, 4-6-lobed, imbricate. *Petals* 4-6, inserted under and outside the disk, valvate. *Disk* annular, crenately lobed, fleshy. *Stamens* 8-12, nearly equal, inserted at the base of the disk within the petals, filaments subulate, anthers ovate. *Ovary* ovoid or subglobose, 4-5-celled; style short; stigma 4-5-lobed; ovules 2 in each cell, collateral. *Fruit* a globose or ovoid drupe with usually 1-3 pyrenes covered with a fibrous arilliform pulp; pyrenes very hard, bony. *Seed* conform to the pyrene; testa membranous; cotyledons contortuplicate.

PROTIUM SERRATUM, Engl. *Bursera serrata*, Colebr.; F. B. I. i. 530. *Icica indica*, W. & A. 177.

N. Circars, Hills of the E. Ghāts from Ganjam to the Godavari, in ravines and along streams; Deccan, in Hyderabad.

A large evergreen tree with serrate leaves, very small flowers, a subacid 1-3-lobed fruit and a reddish close-grained wood.

Vern. *Ur.* Sorupotri moi; *Tel.* Chitreka.

5. *Canarium*, Linn.

Tall trees. *Leaves* large, alternate, imparipinnate; leaflets usually petiolulate, opposite, often unequal, stipulate or exstipulate. *Flowers* hermaphrodite or polygamous, in terminal or axillary often elongate panicles. *Calyx* cupular or urceolate, 3-lobed, valvate, persistent. *Petals* 3, imbricate or valvate, ovate or oblong, inserted outside the disk. *Disk* annular, entire or

lobed. *Stamens* 6, rarely only 3, inserted outside the disk; filaments free or connate at the base; anthers oblong-triangular, dorsifixed, introrse. *Ovary* ovoid, in ♂ flowers reduced to a pistillode, 2-3-celled; style stout; stigma capitate, 2-3-lobed. *Fruit* an ovoid or ellipsoid, often trigonous drupe with a 1-3-celled, 1-3-seeded stone. *Seed* conform to the cell; testa membranous; cotyledons contortuplicate, often divided.

CANARIUM STRICTUM, Roxb.; F. B. I. i. 534; W. & A. 175; Bedd. Fl. t. 128.

W. Ghâts, common in moist evergreen forests, up to about 5,000 ft.

A very large, handsome tree with straight white cylindrical stem. The large pinnate leaves when very young are bright yellow turning velvety crimson, when older they are rusty tomentose and at length subglabrous. The flowers are polygamous and the stamens have the filaments combined in a tube. The wood is soft and of little value. The tree gives a black resin. Vern. *Tam.* Karapu kangiliam, Karang kunthrikam; *Mal.* Kunthirikka payin, Thalli; *Kan.* Manda dhup.

Canarium commune, Linn., is a large tree occasionally found in cultivation.

Family XXXVIII. MELIACEAE.

Trees or shrubs. *Leaves* alternate; usually pinnate, rarely simple or bipinnate; leaflets opposite or alternate, generally oblique at the base; stipules 0. *Flowers* regular, hermaphrodite or polygamo-dioecious, in terminal or axillary panicles. *Calyx* usually small, 3-6-lobed, rarely entire or with free sepals, usually imbricate. *Petals* 3-6, free or rarely connate at the base, sometimes adnate below to the staminal-tube, valvate imbricate or contorted. *Disk* tubular or annular, free or adnate to the ovary or obsolete. *Stamens* 4-12; filaments connate in a tube or rarely free; anthers erect, usually sessile on the tube, included or exerted, 2-celled, longitudinally dehiscent. *Ovary* usually free, 2-5-celled; style simple; stigma disciform or capitate; ovules 2, rarely more, collateral or superposed, rarely solitary. *Fruit* dehiscent or indehiscent, capsular baccate or drupaceous. *Seeds* sometimes arillate, sometimes winged; exalbuminous or with fleshy albumen, embryo usually flat, cotyledons fleshy.

Stamens united in a tube :—

Seeds without wings :—

Cells of ovary with 1-2 ovules :—

Leaflets usually toothed :—

Seeds albuminous ; cotyledons thin, foliaceous :—

Flowers elongate :—

Fruit a capsule, chiefly shrubs :—

Leaves simple, entire or obtusely lobed ; ovules 2, superposed1. **Turraea**.

Leaves 3-foliolate, leaflets entire or obtusely lobed ; petioles winged ; ovules 2, collateral ...2. **Naregamia**.

Leaves pinnate, leaflets entire or coarsely lobed ; ovules 2, superposed.....3. **Munronia**.

Fruit a fleshy drupe, chiefly trees ; leaves usually bipinnate ; ovules 2, superposed.....4. **Melia**.

Flowers globose ; fruit a 5-celled drupe ; leaves pinnate, leaflets entire or serrate ; ovules 2, collateral ...5. **Cipadessa**.

Seeds exalbuminous ; leaves pinnate, leaflets serrate ; fruit a 1-seeded drupe ; ovules 2, collateral6. **Azadirachta**.

Leaflets entire ; seeds exalbuminous ; cotyledons fleshy :—

Flowers and staminal-tube oblong ; ovules 2 ; disk tubular or cupshaped7. **Dysoxylum**.

Flowers and staminal-tube globose or turbinate ; ovules 1-2 in each cell :—

Anthers included in the staminal-tube or only the tips exerted :—

Anthers 5, isomerous ; seeds exarillate ; disk 0 or obscure8. **Aglaia**.

Anthers 6-10, usually 6, in one row ; seeds arillate ; fruit a loculicidal capsule.....9. **Amoora**.

Anthers 10, in 2 rows ; seeds arillate ; fruit a berry

10. **Lansium**.

Anthers exerted or filaments more or less free :—

Seeds arillate :—

Berry indehiscent ; filaments more or less connate, sometimes free11. **Walsura**.

Capsule loculicidal ; filaments connate below, free at apex12. **Heynea**.

Seeds exarillate ; staminal-tube globose, the anthers attached by the backs of their connectives

13. **Beddomea**.

Cells of ovary with 2-12 ovules ; fruit a large capsule, seeds angular ; arillus 0.....14. **Xylocarpus**.

Seeds with wings; leaves pinnate or sometimes bipinnate; cells of ovary with numerous ovules:—

Staminal-tube cupshaped; disk conspicuous; seeds albuminous, winged at both ends15. **Soymida**.

Staminal-tube urceolate; disk annular; seeds albuminous, winged at the upper end.....**Swietenia**.

Staminal-tube cylindric; disk 0; seeds winged below only, exalbuminous.....16. **Chukrasia**.

Stamens distinct on a fleshy torus, sometimes with alternating staminodes; cells of ovary with 8–12 ovules; seeds albuminous, winged at both ends or only below17. **Cedrela**.

1. Turraea, Linn.

Trees or shrubs. *Leaves* simple, alternate, entire or obtusely lobed. *Flowers* hermaphrodite, in axillary clusters or short racemes, bracteate. *Calyx* campanulate, 4–5-lobed. *Petals* 4–5, free, elongate, linear-spathulate. *Disk* annular or obsolete. *Staminal-tube* cylindric, elongate, toothed at the apex; anthers 8–10, short, inserted just within the mouth of the tube, alternating with the teeth. *Ovary* 5- or more-celled; style elongate, exsert; stigma urceolate or capitate; ovules 2 in each cell, superposed. *Fruit* a 4- or more-celled capsule; cells 1–2-seeded; valves woody or coriaceous, separating from the winged axis. *Seeds* oblong, with a broad ventral hilum; albumen fleshy; cotyledons foliaceous; radicle superior.

TURRAEA VILLOSA, Benn.; F. B. I. i. 542; Wt. Ic. t. 1593.

W. Gháts in the Anamalai Hills up to 4,000 ft. (Beddome, Fischer); hills of Travancore (Wight), not common.

A large shrub with membranous ovate acuminate entire leaves up to 4 in. long and large white fragrant flowers up to 2 in. long.

2. Naregamia, W. & A.

A small branching undershrub. *Leaves* alternate, 3-foliolate, petiole winged. *Flowers* solitary or 2 together, axillary. *Calyx* 5-lobed, imbricate. *Petals* 5, free, elongate, linear-spathulate. *Disk* annular. *Staminal tube* long, slender, cylindric below, inflated near the top and sometimes cleft in two parts, obscurely 10-crenate at the mouth; anthers 10, appendaged at the apex. *Ovary* 3-celled; style filiform; stigma capitate; ovules 2 in each cell, collateral, pendulous. *Fruit* an ovoid-globose capsule,

loculicidally 3-valved, the valves separating from the 3-winged axis, the cells 2-seeded. *Seeds* pendulous, curved, truncate at both ends, muricate, with a short double membrane along the side next the axis; albumen fleshy; cotyledons flat, foliaceous.

NAREGAMIA ALATA, W. & A. 117; F. B. I. i. 542; Wt. Ic. t. 90.

W. Gháts, in all Districts, up to 3,000 ft., in forest undergrowth.

An undershrub with pretty white flowers 1-1½ in. long, the leaflets small, cuneate-obovate. Vern. *Mal.* Nelanáregam.

3. Munronia, Wt.

Shrubs or undershrubs. *Leaves* alternate, imparipinnate; leaflets opposite, entire or coarsely toothed. *Flowers* hermaphrodite, elongate, in few-flowered bracteate axillary cymes. *Calyx* usually with elongate tube, 5-lobed, lobes subfoliaceous. *Petals* 5, elongate-spathulate, free or partly cohering, spreading. *Disk* tubular, membranous, sheathing the ovary and base of the style. *Staminal-tube* cylindrical, 10-toothed at the apex; anthers 10, terminal, apiculate. *Ovary* 5-celled; style elongate, slender; stigma capitate; ovules 2 in each cell, superposed. *Fruit* a depressed-globose, 5-lobed, loculicidal capsule; valves separating from the 5-winged axis. *Seeds* plano-convex, the hilum ventral, hollowed, the margins fringed with incurved laciniae; albumen thin; cotyledons flat, foliaceous; radicle short.

MUNRONIA WALLICHII, Wt. Ill. i. 147; F. B. I. i. 543. *M. neelgherrica*, Wt. Ill. i. 147, t. 54.

W. Gháts from S. Canara to the Anamalais and Pulneys, up to 4,000 ft.

A low shrub in thick forest undergrowth. Flowers conspicuous, pink; leaflets 5-9, lanceolate or ovate, pubescent; capsule pubescent, about 5 in. in diam.

4. Melia, Linn.

Trees or shrubs. *Leaves* alternate, 2-3-pinnate; leaflets toothed, serrate or entire. *Flowers* hermaphrodite, in large many-flowered axillary panicles. *Calyx* 5-lobed, imbricate. *Petals* 5, free, much longer than the calyx-lobes. *Disk* annular. *Staminal-tube* a little shorter than the petals, cylindric, slightly dilated and lacinate at the mouth; anthers 10, within the tube at its apex, apiculate. *Ovary* 5-8-celled; style cylindric, elongate;

stigma capitate, sometimes lobed; ovules 2 in each cell, superposed. *Fruit* a fleshy drupe with hard woody endocarp; cells 1-seeded. *Seeds* pendulous, elliptic; testa crustaceous; albumen fleshy or scanty; cotyledons foliaceous; radicle terete, superior.

Flowers lilac; anthers nearly equalling the laciniae of the purple staminal tube; drupe ellipsoid-globose, .5-.7 in. in diam....1. *Azedarach*. Flowers white; anthers exceeding the laciniae of the white staminal tube; drupe ovoid or ellipsoid, 1-1.5 in. long2. *composita*.

1. MELIA AZEDARACH, Linn.; F. B. I. i. 544; W. & A. 117; Wt. Ic. t. 160; Bedd. Fl. t. 13.

Cultivated in most Districts and occasionally found run wild. The Persian Lilac.

A pretty but not very big tree with a soft red-cedar-like wood, useful for furniture, but little used as it is not a forest tree properly speaking. Vern. *Hind*. Bakain; *Tel*. Taraka vepa; *Tam*. Mallay vembu; *Kan*. Bévu.

2. MELIA COMPOSITA, Willd.; W. & A. 117; Bedd. Fl. t. 12.

M. dubia, Hiern in F. B. I. i. 545 (*not of Cav.*).

N. Circars, Hills of Ganjam; Deccan in the Nallamalalai Hills of Kurnool at 2,000 ft.; W. Gháts from S. Canara to Tinnevely at low elevations.

A large deciduous tree with a soft reddish-white wood. Vern. *Tam*. Mallay vembu; *Kan*. Heb bévu.

5. *Cipadessa*, Blume.

Small trees or shrubs. *Leaves* alternate or subopposite, imparipinnate; leaflets opposite or nearly so, entire or coarsely serrate; stipules 0. *Flowers* small, hermaphrodite, in axillary peduncled panicles. *Calyx* 5-lobed. *Petals* 5, oblong, free, spreading, valvate. *Disk* cupular, adnate to the base of the staminal tube. *Stamens* 5-10; filaments united below in a short tube, free above, 2-toothed at the apex; anthers inserted between the teeth, short, apiculate. *Ovary* 5-celled; style short; stigma clavate-capitate; ovules 2 in each cell, collateral. *Fruit* a 5-ribbed, 5-celled, hardly fleshy drupe; cells 1-2-seeded. *Seeds* angled; albumen fleshy; embryo curved, the cotyledons oblong; radicle superior.

CIPADESSA BACCIFERA, Miq. *C. fruticosa*, Bl.; F. B. I. i. 545.

Mallea Rothii, W. & A. 118.

N. Circars, common on laterite hills, near villages and in dry

forests; Deccan, chiefly in hilly country, up to 4,000 ft.; W. Gháts, in forest undergrowth up to 5,000 ft.

A bushy shrub or small tree with pinnate leaves and small flowers. The wood is red and used for fuel. Vern. *Hind.* Nal bila; *Ur.* Ranabili; *Tel.* Chend-bera, Purudona; *Tam.* Pulippan cheddi.

6. *Azadirachta*, A. Juss.

Tree. *Leaves* alternate, imparipinnate; leaflets subopposite, serrate, very unequal at base. *Flowers* hermaphrodite, in axillary panicles. *Calyx* 5-lobed. *Petals* 5, much exceeding the calyx, free, imbricate. *Disk* 0. *Staminal tube* a little shorter than the petals, cylindric, widening above, 9-10-lobed at the apex, the lobes truncate, again slightly toothed; anthers within the tube opposite to and shorter than the lobes. *Ovary* 3-celled; style elongate, slender; stigma shortly cylindric, 3-lobed; ovules 2 in each cell, collateral. *Fruit* a 1-seeded drupe, endocarp woody. *Seed* ellipsoid; albumen 0; cotyledons thick, fleshy, cordate at base; radicle superior.

AZADIRACHTA INDICA, A. Juss.; W. & A. 118; Wt. Ic. t. 17.

Melia Azadirachta, Linn.; F. B. I. i. 544; Bedd. Fl. t. 14.

Dry forests of the Deccan and Carnatic; elsewhere largely planted and often found run wild; will thrive on black cotton soil. The Neem or Margosa tree.

A very important and useful deciduous tree with a hard close-grained wood resembling Mahogany. The bark, leaves, flowers, seeds and the oil they give, are all in use for food, medicinal and other purposes. Vern. *Hind.* Nim.; *Tel.* Yapa, yepa; *Tam.* Vepa.

7. *Dysoxylum*, Blume.

Trees. *Leaves* large, alternate or rarely opposite, imparipinnate or abruptly pinnate; leaflets entire, opposite or alternate, oblique; stipules 0. *Flowers* hermaphrodite, paniculate. *Calyx* subentire or 4-5-lobed. *Petals* 4-5, oblong, spreading, valvate or slightly imbricate. *Staminal tube* cylindrical, dentate or crenulate at the mouth; anthers 8-10, included or half exserted, inserted below the apex of the staminal tube. *Disk* tubular or cupshaped, as long as or longer than the ovary which it surrounds. *Ovary* free, 2-5-celled; attenuated into a long style; stigma broadly

capitate; ovules 1-2 in each cell, superposed or collateral. *Fruit* a globose or pyriform 1-4-celled loculicidal capsule; valves coriaceous. *Seeds* without, rarely with, an arillus; testa coriaceous; albumen 0; cotyledons thick, fleshy; plumule often hirsute, enclosed between the cotyledons.

Calyx cupshaped, subentire, nearly half the length of the petals; leaflets reticulately nerved; disk tubular, acutely lobed; ovary 3-5-celled; capsule reddish1. *binectariferum*.

Calyx very shortly 4-lobed; leaflets not prominently nerved and reticulate; disk tubular, slightly toothed:—

Ovary 2-celled; capsule yellow, rough2. *Beddomei*.

Ovary 4-celled; capsule purple, smooth3. *ficiforme*.

Calyx deeply 4-lobed; leaflets with impressed nerves not prominently reticulate but with regular main nerves; disk cupshaped, entire, only just enclosing the 4-celled ovary; capsule yellow, longitudinally furrowed.....4. *malabaricum*.

1. *DYSOXYLUM BINECTARIFERUM*, Hook. f.; F. B. I. i. 546.
D. macrocarpum, Bedd. Fl. t. 150.

W. Gháts from Coorg to the Anamalais and Tinnevely, in moist forests, but apparently absent from Travancore.

A tree with leaves up to 18 in. long and flowers in racemiform panicles. Vern. *Kan. Agil*.

2. *DYSOXYLUM BEDDOMEI*, Hiern; F. B. I. i. 548.

Evergreen forests of Peermerd and the Cardamom Hills in Travancore, up to 3,400 ft.

A large tree with leaves 12-15 in. long and yellow ribbed capsule. Vern. *Tam. Adanthei*.

3. *DYSOXYLUM FICIFORME*, Gamble. *D. purpureum*, Bourd. in Journ. Bomb. Nat. Hist. Soc. xii. 349, t. 2. *Amoora ficiformis*, Wt. Ill. 147; F. B. I. i. 546 in note under *D. binectariferum*.

Evergreen forests of the Koni and Rani valleys in Travancore, at 1,000 to 2,000 ft.

A large tree with leaves 12-15 in. long and purple smooth capsule. Wood reddish-brown, close-grained. Vern. *Mal. Kar agil*, Puvil agil.

4. *DYSOXYLUM MALABARICUM*, Bedd.; F. B. I. i. 548.

W. Gháts from Mysore to the Anamalais and Travancore, up to 3,000 ft. White Cedar.

A very large tree, reaching 120 ft. in height and 5 ft. in

girth, with pale green leaves and flowers in axillary panicles. Bark grey with white warts. Wood yellowish or light orange, hard and elastic, used in Cochin for oil-casks. Vern. *Mal.* Vella agil.

8. *Aglaia*, Lour.

Trees or shrubs, glabrous stellately-pubescent or -lepidote. *Leaves* alternate, pinnate; leaflets entire, opposite or subopposite; stipules 0. *Flowers* polygamo-dioecious, minute or small, globose, in axillary branching panicles. *Calyx* 5-lobed, imbricate. *Petals* 5, free, concave, imbricate. *Staminal tube* urceolate or subglobose, entire or more or less 5-toothed at the apex; anthers usually 5, erect, included or partly exserted. *Disk* 0 or inconspicuous. *Ovary* ovoid, 1-2- rarely 3-celled; style very short; stigma simple or lobed; ovules 1-2 in each cell. *Fruit* a 1-2-celled and -seeded berry with a coriaceous pericarp. *Seeds* with a fleshy aril-like testa; albumen 0; cotyledons thick, superposed, enclosing the minute villous embryo (corculus).

Stamens quite included in the tube; leaflets with main nerves nearly at right angles with the midrib:—

Leaflets 3-7, flowers in close panicles under 6 in. long:—

Leaflets usually more or less elliptic, sometimes lanceolate or oblanceolate; berry ovoid, not depressed; branches of ♀ panicle spicate, flowers sessile, of ♂ cymose, flowers shortly pedicelled; staminal tube usually somewhat contracted at base, stamens small, on the middle of the tube.....1. *Roxburghiana*.

Leaflets usually lanceolate, sometimes elliptic; berry depressed-globose; branches of panicle cymose, flowers pedicelled; staminal tube not contracted at base, stamens nearly as long as tube

2. *Barberi*.

Leaflets about 13; flowers in lax panicles up to about 15 in. long:—

Leaflets lanceolate, black when dry, unequally acute at base; flowers glabrous, pedicelled, black when dry; calyx-lobes acute ...3. *Maiae*.

Leaflets lanceolate, olive-brown when dry, obtusely acute or even rounded at base; flowers lepidote, sessile, brown when dry; calyx-lobes obtuse, ciliate4. *canarensis*.

Stamens exsert from the tube:—

Leaflets 3-7, oblanceolate, densely scaly beneath with very prominent oblique main nerves; flowers in close panicles under 6 in. long, pedicels short5. *Bourdillonii*.

Leaflets up to about 15, conspicuously but not very obliquely nerved, densely stellately tomentose ; flowers in spreading panicles up to 18 in. long ; pedicels long, slender6. *minutiflora*.

1. *AGLAIA ROXBURGHIANA*, Hiern ; F. B. I. i. 555, *in part*.
Milnea Roxburghiana, W. & A. 119 ; Wt. Ic. t. 166.

South Deccan ; W. Gháts, in S. Canara and Malabar.

A tree with 5–7 leaflets, which are oblong, nearly sessile, and up to 6 in. long and 2 in. broad.

Apparently a rather scarce tree, well figured in Ic. t. 166.

But there are also two well-marked varieties :—

var. 1. *Beddomei*, *A. Roxburghiana*, Bedd. Fl. t. 130A.

Leaflets usually 7, narrow lanceolate, rarely oblanceolate, pale beneath and drying grey, up to 4 in. long and 1 in. broad ; flowers pedicelled (in ♂ at any rate) ; berry globose, 1·5 cm. in diam.

E. Gháts, from Ganjam to Godavari ; Hills of the Deccan ; Travancore up to 3,000 ft.

A tree with bright red hard wood and light brown bark.

Vern. *Tel.* Yerra aduga ; *Tam.* Chokkala ; *Mal.* Punyáva.

Var. 2. *courtallensis*, leaflets usually 5, small, oblanceolate, very grey when dry, 1–2·5 in. long and ·5–1 in. broad ; berry small.

W. Gháts, in the Hills of Tinnevely.

2. *AGLAIA BARBERI*, Gamble in Kew Bull. 1915, 346.

W. Gháts, in the Anamalai Hills and those of Travancore and Tinnevely, at about 3,000 ft.

3. *AGLAIA MAIAE*, Bourdillon in Journ. Bomb. Nat. Hist. Soc. xii. 349.

W. Gháts, in the Hills of Travancore, up to 1,200 ft. (Bourdillon).

A handsome evergreen tree with dark reddish-brown bark and sweet-scented wood. The leaves and flower panicles are black when dry.

4. *AGLAIA CANARENSIS*, Gamble in Kew Bull. 1915, 347.

W. Gháts of S. Canara.

5. *AGLAIA BOURDILLONII*, Gamble in Kew Bull. 1915, 346. *A. Roxburghiana*, Bedd. Fl. t. 130B, *not of* W. & A.

W. Gháts, in the Hills of Travancore, above 3,500 ft. (Beddome, Bourdillon).

6. *AGLAIA MINUTIFLORA*, Bedd. Ic. t. 193. *A. minutiflora*, var. *travancorica*, Hiern in F. B. I. i. 557.

W. Gháts, in the Anamalai and Travancore Hills, from 1,500 to 3,000 ft., in the evergreen forests.

A slender tree with long leaves, large, very tomentose, long-acuminate leaflets and minute flowers in large panicles.

The wood is reddish-pink and fragrant. Vern. *Mal. Nir mulei*.

Aglaia odorata, Lour., is a small pretty tree sometimes found in Madras gardens.

9. *Amoora*, Roxb.

Trees, the young parts sometimes lepidote. *Leaves* imparipinnate; leaflets oblique, entire. *Flowers* polygamo-dioecious, small, ♂ paniculate, ♀ or ♀ in spikes or racemes. *Calyx* 3-5-lobed. *Petals* 3-5, thick, concave, imbricate. *Disk* 0. *Staminal-tube* subglobose or campanulate, slightly crenate at the mouth; anthers 6-10, included. *Ovary* short, 3-celled; style 0 or short; stigma pyramidal or disciform, usually vertically lobed; ovules 1-2 in each cell, in ♂ flowers abortive or absent. *Fruit* a subglobose coriaceous loculicidally 3-5-valved capsule. *Seeds* surrounded by a fleshy aril, the hilum ventral; testa coriaceous; albumen 0; cotyledons superposed or conferruminate, enclosing the minute villous embryo.

Inflorescence as long as or nearly as long as the nearly glabrous leaves:—

Petals 3; *stamens* 6-7; leaves large, up to 2 ft. long; leaflets thick, 9-17, up to 9 in. long, 4 in. broad; ♂ flowers in panicles of spikes or racemes, ♀ flowers in long spikes1. *Rohituka*.

Petals 4; *stamens* 8-10; leaves moderate-sized, up to 1 ft. long; leaflets rather thin, 5, up to 7 in. long, 2.5 in. broad; ♂ flowers in panicles of racemes, ♀ flowers in short spikes2. *Lawii*.

Inflorescence much shorter than the lepidote leaves, up to 5 in. long; leaves large, up to 15 in. long; leaflets thin, up to 7 in. long, 3 in. broad; flowers very small, petals 4, stamens 6-73. *canarana*.

1. *AMOORA ROHITUKA*, W. & A. i. 119; F. B. I. i. 559; Bedd. Fl. t. 132.

W. Gháts, in all Districts from S. Canara to Tinnevely, at low elevations and up to 3,500 ft. in moist forests, especially common and usually with pedicellate male flowers in the Anamalais.

A moderate-sized evergreen tree with a red useful hard wood, little used. Vern. *Hind*. Harin-hara; *Mal*. Chem-maram.

2. AMOORA LAWII, Bedd. Fl. t. 133; F. B. I. i. 561.

W. Gháts, in Malabar (Wight), Tinnevely (Brasier).

A moderate-sized tree, apparently scarce.

3. AMOORA CANARANA, Hiern in F. B. I. i. 560.

W. Gháts, in the Anamalais (Beddome), Travancore Hills in evergreen forests up to 3,500 ft.

A large evergreen tree.

10. *Lansium*, Rumph.

Trees or shrubs. *Leaves* imparipinnate, leaflets alternate or opposite, shortly petiolulate, entire. *Flowers* polygamo-dioecious, 5-merous, the ♂ usually in panicles, the ♀ in spikes or racemes. *Calyx* of 5 rounded imbricate sepals. *Petals* 5, concave, connivent, imbricate. *Disk* inconspicuous. *Staminal tube* globose, crenulate; anthers 10, usually in two rows, the lower included, the upper partly exserted, sometimes apiculate, the attached filaments prominent. *Ovary* globose, 3-5-celled; style very short, thick; stigma 3-5-lobed, truncate; ovules 1-2 in each cell, attached to the axis. *Fruit* a 1-5-celled corky or fleshy berry. *Seeds* solitary or 2, collateral, oblong, imbedded in a pulpy aril; albumen 0; cotyledons transverse; radicle superior.

LANSIUM ANAMALLAYANUM, Bedd.; F. B. I. i. 558; Bedd. Ic. t. 105, Fl. t. 131.

W. Gháts, in the Anamalais and the Hills of Malabar, Travancore and Tinnevely at 1,500 to 3,000 ft.

A handsome medium-sized tree of the evergreen forests, said to have a pink, sweet-scented wood and edible fruit. Vern.

Tam. Santhana viri; *Mal*. Vandakamin.

Lansium domesticum, Jack, the "Doekoe" tree of Java, is sometimes cultivated for its excellent fruit.

11. *Walsura*, Roxb.

Trees. *Leaves* imparipinnate; leaflets 1-5, usually opposite, entire; stipules 0. *Flowers* small, hermaphrodite, in axillary and terminal panicles. *Calyx* small, 5-lobed, the lobes imbricate. *Petals* 5, oblong, slightly imbricate or subvalvate. *Stamens* 8 or 10, linear or subulate, free or partly connate in a tube, the apex

usually notched ; anthers terminal or inserted in the notches of the filaments. *Disk* usually annular, fleshy. *Ovary* short, 2-3-celled, sunk in the disk ; style short, obconic ; stigma turbinate-capitate, 2-3-toothed at apex ; ovules in each cell 2, collateral. *Fruit* an indehiscent tomentose berry, 1- rarely 2-celled, 1-2-seeded. *Seed* enclosed in a fleshy arillus ; albumen 0 ; cotyledons thick, fleshy, plano-convex ; radicle superior.

WALSURA PISCIDIA, Roxb. ; F. B. I. i. 564 ; W. & A. 120.

W. ternata, Roxb. ; F. B. I. i. 563 ; W. & A. 120.

N. Circars and Carnatic, in dry evergreen forests, especially near the coast, as at Vizagapatam, Striharikota in Nellore, Pulicat, and in S. Arcot ; Hills of the Deccan, in Cuddapah and Chingleput ; W. Gháts, in the Anamalais, Pulneys and Travancore.

A moderate-sized tree with trifoliolate leaves, corymbosely panicked flowers, ovoid fruit, 5 in. long, with a white aril and hard dark red black-streaked wood. Vern. *Tel.* Walursi ; *Tam.* Walsura ; *Mal.* Pér illa piccha.

12. Heynea, Roxb.

Trees or rarely shrubs. *Leaves* imparipinnate ; leaflets 5-11, opposite, petiolulate, entire. *Flowers* small, hermaphrodite, in long-peduncled terminal and axillary panicles. *Calyx* short, 4-5-lobed, lobes imbricate. *Petals* 4-5, free, oblong, suberect, subimbricate. *Stamens* 8-10 ; filaments connate more or less in a tube, linear, 2-toothed at apex ; anthers ovate, attached between the teeth, mucronate. *Disk* annular, fleshy. *Ovary* sunk in the disk, 2-3-celled ; style slightly obconic ; stigma 2-3-toothed with a thickened base ; ovules 2 in each cell, collateral, pendulous. *Fruit* a 1-celled, 2-valved capsule. *Seeds* surrounded by a fleshy white aril ; testa membranous ; albumen 0 ; cotyledons hemispheric, plano-convex ; radicle superior.

HEYNEA TRIJUGA, Roxb. ; F. B. I. i. 565. *H. affinis*, Juss. ; W. & A. 121 ; Bedd. Fl. t. 134.

E. Gháts, in the forests of Godavari and Vizagapatam, to 4,500 ft. ; W. Gháts, common from Mysore through Nilgiris and Anamalais to Travancore, up to 6,000 ft.

A small pretty tree with pinnate long-petiolulate leaves, corymbose panicles of small flowers and white arillate seeds. Wood grey, moderately hard. Vern. *Kan.* Kora ; *Mal.* Korakadi.

13. *Beddomea*, Hook. f.

Trees or shrubs, usually lepidote- or stellate-pubescent. *Leaves* alternate, simple or pinnate; leaflets entire. *Flowers* hermaphrodite, in axillary panicles of racemes. *Calyx* 4-6-lobed, imbricate. *Petals* 5-6, free, concave, much imbricate. *Staminal tube* globose, crenulate at the small mouth; anthers 5-6, included or partly exserted, their connectives thick, attached broadly to the tube at their back. *Disk* inconspicuous or 0. *Ovary* short, villous, 3-celled; style short; stigma 3-lobed; ovules 2 in each cell, collateral. *Fruit* an ovoid or obovoid, beaked, furrowed, stellate-pubescent capsule, finally dehiscent in 2-3 cells. *Seeds* 3-5, exarillate; albumen 0; cotyledons fleshy, superposed, enclosing the radicle.

Leaflets 3-5; calyx small, spreading; staminal tube thick, enclosing the large anthers; capsule obovoid1. *indica*.
 Leaflet 1; calyx usually large, enclosing the petals; staminal tube thin, the anthers small, inserted near the top and partly exsert; capsule oblong
 2. *simplicifolia*.

1. *BEDDOMEA INDICA*, Hook. f.; F. B. I. i. 566.

W. Gháts on the E. slopes of Nilgiris and Hills of Malabar, up to 3,000 ft.

A shrub of the evergreen forest undergrowth.

2. *BEDDOMEA SIMPLICIFOLIA*, Bedd. Fl. t. 135; F. B. I. i. 566.

W. Gháts from Coorg to Travancore and Tinnevely, at 2,000 to 4,000 ft.

A small tree with rather variable inflorescence, separable into three varieties: (1) large flowers in long stout racemes, (2) small flowers in short panicles, and (3) medium flowers in long slender racemes, but they all agree in foliage.

14. *Xylocarpus*, Koen.

Trees, always littoral. *Leaves* alternate, paripinnate; leaflets 1-3 pairs, sometimes solitary. *Flowers* hermaphrodite, in lax few-flowered axillary panicles. *Calyx* 4-lobed, short. *Petals* 4, free, spreading, contorted. *Staminal tube* urceolate-globose, 8-toothed at apex, the teeth again bilobed; anthers 8, included just under the teeth of the tube and alternate with them. *Disk* cupular, fleshy. *Ovary* 4-celled; style thick, short; stigma discoid; ovules 2-12 in each cell. *Fruit* a large globose 4-celled capsule. *Seeds*

6-12, large, thick, angular, pyramidal, convex on the back, arranged radially from the remains of the axis outwards; testa hard; albumen 0; cotyledons superposed, often conferruminate; radicle dorsal at one corner.

XYLOCARPUS OBOVATUS, A. Juss. *X. Granatum*, W. & A. 121, not of Koen. *Carapa moluccensis*, Bedd. Fl. t. 136, not of Lam.; F. B. I. i. 567.

Swamp forests of East Coast, in the deltas of the Kistna (A. W. Lushington) and Coleroon (Wooldridge).

A moderate-sized evergreen tree with coriaceous leaves, grey bark, and a valuable hard dark red wood. Vern. *Hind* Pussur; *Tam.* Somunthiri.

15. *Soymida*, A. Juss.

Large trees. *Leaves* alternate, paripinnate; leaflets opposite, entire or when young crenate-serrate, obtuse, unequal at base. *Flowers* in large terminal or axillary panicles. *Calyx* saucer-shaped, 5-lobed, the lobes imbricate. *Petals* 5, free, spreading, obovate, unguiculate. *Staminal tube* short, cupshaped, 10- sometimes 8-cleft, the lobes again bifid; anthers short, attached to the cleft of the lobes by their backs. *Disk* flat. *Ovary* 5-celled; style short; stigma thick, discoid, 5-angled; ovules many in each cell, biseriate, pendulous. *Fruit* a woody 5-celled, septifragally 5-valved capsule, the valves 2-lamellate, separating from the thick 5-winged axis. *Seeds* numerous, flattened, winged at both ends; albumen fleshy; cotyledons foliaceous, 2-auricled at base; radicle short, superior.

SOYMIDA FEBRIFUGA, Adr. Juss. ; F. B. I. i. 567; W. & A. 122; Bedd. Fl. t. 8. *Swietenia febrifuga*, Roxb. Cor. Pl. i. t. 17.

N. Circars, from Ganjam to the Godavari, in dry forests and on laterite hills; forests of the Deccan from Kurnool to Mysore, and the Hills of Chingleput.

A large tree with greyish-green leaves, thick bluish-grey or brown bitter bark and very hard dark red strong and handsome valuable wood. Vern. *Hind.* Rohan; *Ur.* Sohan; *Tel.* Sumi; *Tam.* Shem; *Kan.* Sombi.

16. *Chukrasia*, Adr. Juss.

Lofty trees. *Leaves* alternate, abruptly pinnate or bipinnate; leaflets alternate or subopposite, entire, unequal at base, acuminate,

usually pubescent or even velvety. *Flowers* hermaphrodite, rather large, in terminal panicles. *Calyx* short, 4-5-lobed, with obtuse lobes. *Petals* 4-5, oblong, free, erect, contorted. *Staminal tube* cylindric, with 8-10 short crenate lobes at the apex; anthers erect, inserted within the crenatures and entirely exsert above them. *Disk* 0. *Ovary* shortly stipitate, cylindric-ovoid, 3-5-celled; style stout; stigma cylindric-capitate; ovules many in each cell, biseriate. *Fruit* a 3-5-celled, septifragally 3-5-valved capsule, the valves 2-lamellate separating from the 3-winged axis and often cleft at apex. *Seeds* many, flattened, broadly winged below; albumen 0; cotyledons orbicular.

CHUKRASIA TABULARIS, Adr. Juss.; F. B. I. i. 568 (*Chikrassia*); W. & A. 123; Wt. Ill. t. 56; Bedd. Fl. t. 9.

Hills of the Deccan up to 4,500 ft., Horsley Konda in Cuddapah, Sandúr Hills of Bellary, Hills of Mysore and Salem; W. Gháts, from Mysore to Tinnevely in evergreen forests at rather low elevations.

A very large and beautiful tree with a reddish-brown bark and yellowish-brown to reddish-brown wood resembling Mahogany. Vern. *Hind.* Chikrasi; *Tel.* Madagari vembu; *Tam.* Aglay, Malei veppu; *Mar.* Pabba.

17. Cedrela, Linn.

Tall trees. *Leaves* imparipinnate; leaflets numerous, opposite or subopposite, entire or serrate. *Flowers* hermaphrodite, small, white, in terminal or subterminal panicles. *Calyx* short, 5-lobed. *Petals* 5, oblong, suberect, free, imbricate. *Stamens* 4-6, free, inserted on a 4-6-lobed raised *disk*, sometimes with alternating staminodes; filaments subulate; anthers oblong, versatile. *Ovary* sessile on the disk, 5-celled; style slender; stigma discoid; ovules in each cell 8-12, biseriate, pendulous. *Fruit* a coriaceous septifragally 5-valved capsule; valves 2-lamellate. *Seeds* compressed, winged below or at both ends; albumen fleshy; cotyledons flat subfoliaceous; radicle superior.

CEDRELA TOONA, Roxb. Cor. Pl. iii. t. 238; F. B. I. i. 568; W. & A. 124; Wt. Ic. t. 161; Bedd. Fl. t. 10; Brand. For. Fl. t. 14.

E. Gháts in valleys and moist forest localities, fairly common in Ganjam, less so southwards; Hills of the Deccan in Kurnool, Sandúr and Mysore; W. Gháts, common in evergreen forests up to 4,000 ft., especially in the Nilgiris and Anamalais,

Often planted for ornament, or in avenues, or for its wood. The Toon tree.

A large and beautiful tree with pinnate leaves, lanceolate long acuminate leaflets, a reddish-brown bark and even-grained red soft scented wood, useful for building and furniture, cigar-boxes, etc. Vern. *Hind.* Tún; *Ur.* Mahalimbu; *Tam.* Santhana vembu, Thevatharam; *Mal.* Mathagiri vembu; *Kan.* Tundu.

Var. *latifolia*, C. DC. in Rec. Bot. Surv. Ind. iii. 365, with larger and wider leaflets, rounded at the base but finally acute, the margins often somewhat crenate.

W. Gháts in the Nilgiris and Anamalais, at about 6,000 ft.

A large tree and a fairly well-marked variety.

Swietenia Mahagoni, Linn., the Mahogany tree of the W. Indies, is sometimes found in gardens and avenues, and has been planted in some forest localities for its timber.

Family XXXIX. DICHAPETALACEAE, Engler.

Small trees or shrubs. *Leaves* alternate, simple, entire; stipules 2, deciduous. *Flowers* small, unisexual or polygamous, rarely hermaphrodite, in corymbose cymes; peduncles sometimes adnate to petiole. *Sepals* 5, free or connate, often unequal, imbricate. *Petals* 5, free, subperigynous, notched or bifid, with often an inflexed plate adnate to their faces. *Stamens* 5, subperigynous; filaments free or adnate to the petals; anthers oblong, connective often thickened behind, dehiscence longitudinal. *Disk* of 5 glands or scales or a 5-glandular or -lobed cup. *Ovary* free, 2-3-celled; ovules in collateral pairs, pendulous from the apex of each cell, anatropous. *Fruit* a pubescent drupe, oblong or compressed or didymous; epicarp sometimes dehiscent and disclosing the putamen; putamen 1-3-celled, the cells 1-seeded. *Seeds* pendulous; testa membranous; albumen 0; cotyledons thick; radicle small, superior.

Dichapetalum, Dup. Thouars.

Trees or shrubs. *Flowers* polygamo-monoecious. *Sepals* 5, unequal, connate at the base. *Petals* 5, 2-fid. *Stamens* 5, slightly adnate at base to the petals. *Disk* of 5 quadrate scales, placed opposite the petals. *Ovary* 2-3-celled. *Fruit* a 1-2-celled, subdidymous drupe with 1-2-seeded stone.

DICHAPETALUM GELONIOIDES, Engl. *Chailletia gelonioides*, Bedd.; F. B. I. i. 570.

W. Gháts from S. Canara to Anamalais and Travancore, up to 4,000 ft.

A small tree with elliptic or elliptic-lanceolate leaves reaching 6 in. long by 2 in. broad and usually a transversely oblong or obcordate drupe with a soft grey epicarp, scarlet fleshy mesocarp and crustaceous endocarp, enclosing 2 seeds with fleshy cotyledons.

Family XL. OLACACEAE.

Trees or shrubs, sometimes straggling or climbing. *Leaves* usually alternate, entire; stipules 0. *Flowers* small, hermaphrodite. *Calyx* small, sometimes accrescent. *Petals* 5-6, free or slightly connate at base. *Stamens* as many as and opposite to or twice as many as the petals, sometimes with as many or twice as many staminodes alternate with them. *Disk* usually embracing the base of the ovary. *Ovary* free, 1-5-celled; style simple; ovules solitary or 2-3 in each cell. *Fruit* a 1-seeded drupe; albumen copious, fleshy; embryo minute, near the apex of the albumen.

Stamens twice as many as the petals, staminodes 0; erect thorny shrubs or small trees1. **Ximenia**.

Stamens as many as the petals:—

Staminodes present:—

Staminodes slender, bifid, usually twice as many as the generally 3 stamens; straggling often thorny shrubs2. **Olax**.

Staminodes short, thick, as many as the stamens; climbing shrubs with tendrils.....3. **Erythropalum**.

Staminodes absent; trees:—

Calyx adherent to the fruit; anthers oblong, incurved, filaments very short4. **Strombosia**.

Calyx not adherent to the fruit; anthers globose, very small, filaments slender5. **Anacolosia**.

1. **Ximenia**, Linn.

Shrubs or small trees with spinous branches. *Leaves* alternate, simple, entire, shortly petioled. *Flowers* usually hermaphrodite, rather large, racemose. *Calyx* small, 4-5-lobed. *Petals* 4-5, valvate, bearded within, reflexed. *Stamens* twice as many as

petals, hypogynous; anthers erect, linear, 2-celled, dehiscing in opposite longitudinal clefts. *Staminodes* 0. *Ovary* superior, sessile, 3-4-celled; style columnar; stigma simple; ovule solitary in each cell, pendulous, anatropous. *Fruit* an ovoid 1-celled fleshy drupe; stone solitary, putamen crustaceous, 1-seeded. *Seed* with copious albumen, embryo very small.

XIMENIA AMERICANA, Linn.; F. B. I. i. 574; W. & A. 89.

N. Circars, in dry forests in Vizagapatam and Godavari; Deccan, in dry forests on stony ground, common in the Sandúr Hills of Bellary and Walayar Hills of Coimbatore.

A large thorny shrub with small ovate obtuse leaves, bright orange-scarlet edible fruit and yellowish-red hard close-grained wood. Vern. *Tel.* Uranechra; *Tam.* Chiru-illantai.

2. Olax, Linn.

Trees or shrubs, often climbing, sometimes armed. *Leaves* alternate, simple, petioled. *Flowers* in axillary racemes or panicles, sometimes solitary, minutely bracteate. *Calyx* minute, cupular, truncate or obscurely toothed, enlarged in fruit. *Petals* hypogynous, valvate, free or more or less connate, usually 3 two deeply or entirely bifid one entire. *Stamens* usually 3 fertile, attached opposite to the petals at or near the base alternate with 6 bifid staminodes; anthers oblong, 2-celled, dehiscing longitudinally. *Ovary* free, more or less 3-celled, its base surrounded by a shallow hypogynous disk; style simple; stigma 3-lobed; ovules 3, pendulous from the tip of a central placenta. *Fruit* a drupe more or less enclosed in the accrescent calyx; stone crustaceous, 1-celled, 1-seeded. *Seed* inverse; albumen copious; embryo minute near the apex of the albumen, radicle superior.

Small tree; branchlets angled, transversely ridged, glabrous, yellow; leaves ovate-acuminate, 2-3 in. long, glabrous; flowers .25 in. long in small axillary racemes .5 in. long; drupe .4 in. long, less than half covered by the enlarged calyx1. *zeylanica*. Climbing shrubs; drupe at least three-quarters covered by the enlarged calyx:—

Old wood armed with stout curved thorns; branchlets terete, olive-coloured, pubescent; leaves obtuse, puberulous beneath, 2-5 in. long; flowers .3 in. long, in racemes up to 2 in. long; drupe .4 in. long

2. *scandens*.

Unarmed; branchlets glabrous, brown, often prominently lenticellate;

leaves ovate or lanceolate, acute or acuminate, 2-5 in. long; flowers
 ·4 in. long in racemes or short panicles under 1 in. long; drupe up to
 ·7 in. long3. *Wightiana*.
 Erect unarmed undershrub; leaves narrow, about 1·5 in. long by ·25 in.
 broad; flowers solitary, about ·2 in. long; drupe small, globose...4. *nana*.

1. *OLAX ZEYLANICA*, L.; F. B. I. i. 576; W. & A. 88.

Peninsula (Wight 302).

An erect shrub or small tree.

2. *OLAX SCANDENS*, Roxb.; Roxb. Cor. Pl. ii. t. 102; F. B. I. i. 575; W. & A. 89.

N. Circars, Deccan and Carnatic, usually in ravines and near streams.

A rambling or climbing shrub of considerable size, the thorns on old wood. Wood yellowish-white, soft. Vern. *Ur*. Boderia; *Tel*. Kurpodur; *Tam*. Kadalranchi; *Mar*. Harduli.

3. *OLAX WIGHTIANA*, Wall.; F. B. I. i. 575; W. & A. 89.

W. Gháts, in the Anamalai, Pulney and Tinnevely Hills.

A small tree (Bedd.) or climbing shrub with many branches, and usually ovate obtusely acute olive-brown leaves (when dry).

Var. *nigrescens*, Gamble. Leaves lanceolate, acuminate, usually nearly black when dry, branchlets with prominent lenticels.

W. Gháts in the Anamalai Hills (Barber), Sivagiri Hills (Wight).

4. *OLAX NANA*, Wall.; F. B. I. i. 576.

N. Circars, at Karaka Konda, Vizagapatam (Barber).

A small undershrub giving herbaceous shoots from a woody rootstock, and growing up yearly like those of *Grewia sapida* and similar plants when killed down by fire or other causes.

3. *Erythropalum*, Blume.

Climbing cirrhose shrubs. *Leaves* alternate, entire, 3-ribbed, petiolate; tendrils axillary. *Flowers* small, in lax axillary cymes with filiform peduncles and pedicels. *Calyx* adherent, 4-5-lobed. *Petals* 5, valvate. *Stamens* 5, opposite to and inserted on the petals; filaments very short; anthers incurved, 2-celled, the cells opening longitudinally; connective thick. *Staminodes* 5, alternate

with the stamens. *Ovary* half immersed in the disk, 1-celled; style short, conical; stigma minute, 3-lobed; ovules 1-3, pendulous from the apex of the cell. *Fruit* an oblong or obovoid drupe, surmounted by the remains of the calyx; putamen crustaceous. *Seed* pendulous; albumen copious, fleshy; embryo minute.

ERYTHROPALUM POPULIFOLIUM, Mast.; F. B. I. i. 578.

W. Gháts in Malabar, Anamalais and Tinnevely Hills, at low elevations.

A climbing shrub with long-petioled poplar-like subpeltate leaves, usually with 3 prominent ribs and 2 smaller basal ones; the fruit oblong-obovoid, yellowish, .7 in. long.

4. Strombosia, Blume.

Evergreen trees or shrubs, usually glabrous. *Leaves* alternate, simple, entire, coriaceous. *Flowers* small, regular, hermaphrodite, in axillary cymes. *Calyx* cupshaped, more or less 5-lobed. *Petals* 5, free, valvate, hairy within. *Stamens* 5, opposite the petals and adnate to them; anthers 2-celled, introrse. *Staminodes* 0. *Ovary* inferior or superior, imperfectly 4-5-celled, surrounded by a lobed disk; ovules 4-5, pendulous from a central placenta; style short. *Fruit* a drupe, surmounted by the remains of the calyx-lobes and style; stone crustaceous. *Seed* pendulous; albumen copious, fleshy; embryo minute.

STROMBOSIA CEYLANICA, Gardn.; F. B. I. i. 579; Bedd. Fl. t. 137.

W. Gháts, from S. Canara southwards, especially in Travancore, but always scarce.

A large tree with oblong-lanceolate leaves up to 6 in. long by 2 in. broad, very small flowers and a pyriform purple drupe about 1 in. long.

5. Anacolosa, Blume.

Trees or shrubs. *Leaves* alternate, simple, entire, petiolate. *Flowers* in axillary cymes. *Calyx* cupshaped, 5-7-lobed. *Petals* 5-6, free, valvate, hairy within. *Stamens* as many as and opposite to the petals at their base; filaments slender; anthers very small, globose, basifixed, the 2 cells dehiscing longitudinally. *Staminodes* 0. *Disk* cupshaped, surrounding the base of the ovary. *Ovary* 1-celled; style conical; stigma shortly lobed; ovules 2-3, pendulous from a central placenta. *Fruit* a drupe

surrounded by the accrescent disk; stone crustaceous, 1-seeded. *Seed* pendulous; albumen fleshy; embryo minute; radicle superior, thicker than the cotyledons.

ANACOLOSA DENSIFLORA, Bedd.; F. B. I. i. 580; Bedd. Fl. t. 138.

W. Gháts in the Anamalai and Travancore Hills, up to 2,500 ft.

A lofty straight-stemmed tree with oblong leaves up to 6 in. long and 2 in. broad, and many fragrant white flowers. Wood reddish-brown, moderately hard. Vern. *Tam.* Katta oekkali; *Mal.* Kal manikkam.

Family XLI. OPILIACEAE.

Trees or erect or climbing shrubs. *Leaves* alternate, entire. *Flowers* hermaphrodite or dioecious, small, in axillary spikes or racemes. *Calyx* small or minute, obscurely 4-5-lobed. *Petals* 4-5, free or connate in a gamopetalous corolla. *Disk* fleshy entire or of glands as many as the petals and alternate with them. *Stamens* as many as the petals and opposite to them. *Ovary* 1-celled; ovule 1, pendulous. *Fruit* a drupe. *Seed*; albumen fleshy; embryo imbedded in the albumen, cotyledons linear, sometimes 3, sometimes combined; radicle superior.

Petals free; flowers in bracteate racemes1. *Opilia*.

Petals combined in a gamopetalous corolla; flowers in spikes

2. *Cansjera*.

1. *Opilia*, Roxb.

Low trees or climbing shrubs. *Leaves* alternate, entire, penninerved. *Flowers* small, 1-3 together in the axils of peltate deciduous bracts, in axillary racemes, the racemes in bud cone-like. *Calyx* minute, annular, obscurely 5-lobed. *Petals* 5, oblong, valvate. *Disk* of 5 fleshy clubshaped glands alternate with the petals. *Stamens* 5, opposite the petals, filaments slender; anthers small, 2-celled. *Ovary* superior, oblong; style very short; ovule solitary, pendulous. *Fruit* a drupe with fleshy pericarp and thin stone. *Seed* large; albumen copious, fleshy; embryo linear in the centre of the upper part of the albumen; cotyledons joined together, long; radicle superior.

OPILIA AMENTACEA, Roxb. Cor. Pl. iii. t. 158; F. B. I. i. 583; Wt. Ill. t. 40. *Ximenia* ? *olacioides*, W. & A. 89.

A rather scarce weak climbing shrub with pale brown branch-

lets and lanceolate leaves up to 4 in. long ; racemes slender, up to 1.5 in. long ; drupe oblong, glaucous-green.

N. Circars, Deccan and Carnatic, in hilly country especially ; W. Gháts, on the lower slopes of the Anamalais and Pulneys, eastern side.

2. Cansjera, Juss.

Climbing shrubs, sometimes armed. *Leaves* alternate, entire, penninerved. *Flowers* in short axillary spikes, hermaphrodite, bracteolate. *Calyx* very minute, 4-lobed. *Corolla* regular, tubular or urceolate, with 4-5 usually reflexed lobes ; lobes valvate. *Disk* of 4-5 triangular fleshy glands alternate with the corolla-lobes. *Stamens* 4-5, opposite the corolla-lobes ; filaments slender, free, between the glands of the disk ; anthers small, 2-celled. *Ovary* superior, ovoid-conical, 1-celled ; style cylindric ; stigma capitate, 4-lobed ; ovule solitary, pendulous. *Fruit* a drupe with a crustaceous putamen. *Seed* solitary, erect ; albumen copious, fleshy ; embryo small, at the upper end, cotyledons 2-3, radicle superior.

CANSJERA RHEEDII, Gmel. ; F. B. I. i. 582 ; Wt. Ic. t. 1861. *C. scandens*, Roxb. Cor. Pl. t. 103.

N. Circars, Deccan and Carnatic, in hilly country chiefly ; W. Gháts, on the eastern slopes, from Mysore to Tinnevely.

A climbing shrub with occasional curved thorns on the shining brown lenticellate branches ; branchlets greenish, pubescent ; leaves ovate-lanceolate, dull, thinly coriaceous, up to 3 in. long ; spikes about 1 in. long ; drupe orange-red, smooth.

Family XLII. ICACINACEAE.

Trees or shrubs often climbing. *Leaves* alternate, rarely opposite ; usually entire but sometimes toothed ; stipules 0. *Flowers* usually small, hermaphrodite polygamous or dioecious ; inflorescence various ; often articulate under the calyx. *Calyx* small, 5- (rarely 4- or 6-) lobed or partite, sometimes 0. *Petals* 5 (rarely 4 or 6), usually free, sometimes connate, valvate. *Stamens* as many as the petals and usually alternate with them, sometimes alternating with staminodes, in ♀ flowers often reduced to staminodes. *Disk* cupshaped or 5-lobed, often wanting. *Ovary* 1-celled with 2 collateral pendulous ovules. *Fruit* usually a drupe with more or less crustaceous endocarp. *Seed* 1, pendulous, usually

albuminous, sometimes exalbuminous ; cotyledons various, radicle superior.

Albumen copious :—

Cotyledons small ; petals glabrous within ; erect trees or shrubs :—

Filaments usually with short clubshaped hairs on the back ; anthers short, pendulous ; ovary erect ; petals connate ...1. **Gomphandra**.

Filaments glabrous ; anthers long, bipartite at base ; ovary oblique ; petals free2. **Apodytes**.

Cotyledons large, foliaceous :—

Erect trees, usually hermaphrodite ; petals villous within ; flowers in corymbose cymes ; cotyledons cordate.....3. **Mappia**.

Climbers, usually dioecious ; cotyledons orbicular or elliptic :—

Leaves palminerved, dentate :—

Flowers subcapitate on supra-axillary peduncles ...4. **Miquelia**.

Flowers in pendulous extra-axillary racemes.....5. **Natsiatum**.

Leaves entire or coarsely toothed, penninerved ; ♂ flowers in filiform spikes, ♀ in capitate heads6. **Pyrenacantha**.

Albumen 0 ; cotyledons large, fleshy, connate ; climbing shrubs with simple entire reticulate leaves and flowers in pendulous spikes

7. **Sarcostigma**.

1. **Gomphandra**, Wall.

Small trees or shrubs. *Leaves* alternate, entire, penninerved. *Flowers* small, polygamo-dioecious, in axillary or lateral cymes. *Calyx* minute, cupshaped, 4-5-lobed. *Petals* 4-5, more or less connate into a campanulate corolla, free at apex, valvate, the lobes incurved and hooked. *Stamens* 4-5, hypogynous, alternate with the petals ; filaments thick, fleshy, often connate, usually with a tuft of clubshaped hairs on the back at the apex ; anthers pendulous from the interior apex of the filaments, dehiscing longitudinally. Hypogynous *disk* thick, annular or 0. *Ovary* in ♂ flowers sunk in the disk : in ♀ flowers oblong, 1-celled ; style conic ; stigma small or discoid ; ovules 2, collateral. *Fruit* an elongate drupe, topped with the remains of the stigma, pericarp smooth, somewhat ribbed, endocarp leathery. *Seed* pendulous, longitudinally surrounded by the raphe ; albumen fleshy, hollowed ; embryo minute with very small cotyledons.

Leaves membranous, lanceolate, acuminate, main nerves about 6, joining in loops ; inflorescence axillary ; filament hairs conspicuous.

1. *polymorpha*.

Leaves subcoriaceous, very variable in shape, obtuse or obtusely acute, main nerves about 4, irregular, not obviously joining in loops; inflorescence usually leaf-opposed rarely axillary; filament hairs few or none.

2. *coriacea*.

1. GOMPHANDRA POLYMORPHA, Wt. Ill. 103; F. B. I. i. 586, *in part*.
W. Gháts, in Wynaad, Nilgiris and Anamalais in low-level Sholas up to 4,000 ft.
2. GOMPHANDRA CORIACEA, Wt. Ill. 103. *G. polymorpha*, Wt. Ic. tt. 953, 954; F. B. I. i. 586, *in part*.
W. Gháts, common in Sholas of the Nilgiris, Pulneys, Anamalais and Travancore Hills at from 3,000 to 6,000 ft.

2. *Apodytes*, E. Meyer.

Trees or shrubs. *Leaves* alternate, entire, usually turning black in drying. *Flowers* hermaphrodite, in terminal or axillary corymbose cymes. *Calyx* small, cupshaped, 5-toothed. *Petals* 5, hypogynous, free, valvate. *Disk* 0. *Stamens* 5, alternate with the petals; filaments dilated; anthers oblong, bipartite at base, 2-celled, the cells dehiscing longitudinally. *Ovary* 1-celled, obliquely gibbous; style slender; stigma small; ovules 2, pendulous, superposed. *Fruit* an obliquely ovoid compressed drupe; stone crustaceous, 1-celled, 1-seeded. *Seed* pendulous; embryo small, in the apex of fleshy albumen; cotyledons narrow.

Leaves oblong, obtuse, with revolute margins, coriaceous; petals .25 in. long; ovary hairy.....1. *Benthamiana*.

Leaves broadly ovate, acute or acuminate, with flat margins, membranous; petals .15 in. long; ovary glabrous.....2. *Beddomei*.

1. APODYTES BENTHAMIANA, Wt. Ic. t. 1153; F. B. I. i. 588; Bedd. Fl. t. 140, var. α .

W. Gháts in the Nilgiris, Anamalais, Travancore and Tinnevely Hills above 5,000 ft.

A medium-sized tree reaching 40 ft. in height.

2. APODYTES BEDDOMEI, Mast. in F. B. I. i. 588. *A. Benthamiana*, Bedd. Fl. t. 140, var. β .

W. Gháts in the evergreen forests of Nilgiris, Anamalais and Travancore up to 3,000 ft.

A medium-sized tree.

3. *Mappia*, Jacq.

Trees. *Leaves* alternate, simple, penninerved. *Flowers* hermaphrodite or polygamous in terminal corymbose cymes. *Calyx* small, 5-toothed. *Petals* 5, hypogynous, valvate, villous within, apex inflexed. *Stamens* 5, hypogynous, alternate with the petals; anthers oblong, dorsifixed, dehiscing longitudinally. *Disk* cup-shaped surrounding the ovary. *Ovary* 1-celled; style short; stigma thickened; ovules 2, pendulous, collateral. *Fruit* a drupe with thinly crustaceous more or less rugose putamen. *Seed* pendulous with dorsal raphe; albumen fleshy; embryo large with foliaceous cordate cotyledons; radicle superior.

Leaves subcoriaceous, ovate, acute at apex, rounded or subcordate and unequal at base, more or less densely stellate-tomentose beneath; petiole stout 1-1.5 in. long; drupe .5 in. long, putamen rugose, flowers fetid, rather large1. *tomentosa*.

Leaves thickly membranous, glabrous or glabrescent; flowers medium-sized:—

Flowers not fetid; leaves ovate or obovate, abruptly acuminate, transverse nervules prominent and pale beneath; drupe 6 in. long, flattened, putamen scarcely rugose2. *ovata*.

Flowers fetid; transverse nervules of leaves slender, not very prominent:—

Leaves elliptic-ovate or oblong, more or less puberulous beneath and pale; rounded at base; petiole under 1 in. long3. *foetida*.

Leaves oblong or elliptic-oblong, glabrous, acute at base; petiole 1-1.5 in. long4. *oblonga*.

Leaves thinly membranous, glabrous, pale beneath, lanceolate-oblong, acuminate both at apex and base; flowers small5. *Wightiana*.

1. *MAPPIA TOMENTOSA*, Miers; F. B. I. i. 589.

W. Ghâts, in the Nilgiri and Pulney Hills, usually above 5,000 ft.

2. *MAPPIA OVATA*, Miers; F. B. I. i. 589 *in part*.

W. Ghâts, in the Nilgiri, Anamalai, Pulney and Tinnevely Hills.

3. *MAPPIA FOETIDA*, Miers; F. B. I. i. 589. *Stemonurus? foetidus*, Wt. Ic. t. 955.

W. Ghâts, in the Nilgiri Hills up to 7,000 ft.

A tree with greenish-grey bark and white soft wood.

4. *MAPPIA OBLONGA*, Miers; F. B. I. i. 589.

W. Ghâts, in Wynaad and Malabar, up to 4,000 ft.

5. MAPPIA WIGHTIANA, Miers. *M. ovata*, Miers; F. B. I. i. 589
in part.

W. Coast, in Malabar and Travancore, at low levels.

4. Miquelia, Meissn.

Climbing shrubs. *Leaves* alternate, simple, membranous, palminerved. *Flowers* dioecious, subcapitate, with supra-axillary peduncles, ♂ capitate in racemes, ♀ solitary. *Calyx* minute, 4-5-lobed. *Petals*: ♂ connate in a long pedicel-like tube, limb 4-5-lobed, lobes valvate, the tips inflexed; ♀ free or nearly so, at length reflexed. *Stamens* 4-5, alternate with the corolla-lobes, filaments short, in ♀ reduced to staminodes. *Ovary* sessile, 1-celled; style short; stigma dilated, cupular; ovules 2, pendulous from the apex of the cell. *Fruit* an oblong, more or less compressed, drupe; stone crustaceous, tubercled within. *Seed* pendulous; albumen fleshy; embryo with flat elliptic leafy cotyledons.

MIQUELIA DENTATA, Bedd.; F. B. I. i. 593

W. Gháts, in the Anamalais (Beddome).

A climbing shrub with ovate-oblong or lanceolate acuminate membranous dentate leaves, sharply acuminate at apex, 3-ribbed at base, apparently very rare.

5. Natsiatum, Ham.

Climbing subherbaceous shrub. *Leaves* alternate, simple, palmately nerved. *Flowers* dioecious, very small, in pendulous extra-axillary racemes. *Calyx* deeply 5-lobed, persistent. *Petals* 5, free or connate at the base. *Stamens* 5, alternate with the petals and also with 5 2-lobed staminodes; filaments short; anthers sagittate, apiculate, opening longitudinally: in ♀ replaced by compressed glands. *Ovary* sessile, 1-celled; style short, 2-3-lobed at apex; stigmas capitate; ovules 2 collateral, pendulous. *Fruit* an obliquely ovoid compressed black drupe; stone crustaceous, 1-celled. *Seed* solitary; albumen fleshy, embryo with leafy orbicular cotyledons.

NATSIATUM HERPETICUM, Ham.; F. B. I. i. 595.

N. Circars, Mahendragiri Hill in Ganjam at 3,000 ft, (Gamble).

A soft climber with long-petioled cordate dentate leaves and slender whitish racemes of minute flowers.

6. *Pyrenacantha*, Hook.

Climbing shrubs. *Leaves* alternate, entire or coarsely toothed, penninerved. *Flowers* minute, dioecious, ♂ in filiform axillary spikes, ♀ in capitate heads, monochlamydeous. *Perianth* deeply 4-lobed, lobes oblong, inflexed at tip. *Stamens* 4, alternate with the perianth-lobes; filaments short; anthers small, dehiscing longitudinally. *Ovary* in ♂ a villous pistillode, in ♀ oblong, 1-celled; style 0; stigma sessile with many radiating branches; ovules 2, pendulous, collateral. *Fruit* a drupe with thin stone provided on the inner surface with numerous obtuse horizontal spines penetrating the albumen. *Seed* solitary; albumen fleshy; cotyledons large, foliaceous.

PYRENACANTHA VOLUBILIS, Hook. Bot. Misc. ii. 108; Wt. Ill. Suppl. tt. 9. 10.

W. Gháts, in the Pulney Hills (Bourne) and Hills of Tinnevely (Beddome, etc.).

A much-branched climbing shrub with slender branchlets, narrowly rhomboid lanceolate leaves, 3-5 in. long with a pair of glands at the base, male flowers in filiform spikes, female in pedunculate capitate heads, drupe ovoid orange-red.

7. *Sarcostigma*, W. & A.

Climbing shrubs. *Leaves* alternate, simple. *Flowers* dioecious, minute, in distant sessile fascicles on elongate interrupted pendulous lateral spikes. *Calyx* cupshaped, unequally 4-6-lobed. *Petals* 4-6, free or united at base into a short tube, valvate, at length reflexed. *Stamens* 4-6, hypogynous, alternate with the petals: filaments slender; anthers versatile: in ♀ reduced to short subulate staminodes. *Ovary* in ♂ conical, ovules none; in ♀ sessile, 1-celled, superior; stigma umbonate, sessile; ovules 2 pendulous from the apex of the cell with thickened funicle. *Fruit* an oblong somewhat flattened drupe with woody putamen. *Seeds* pendulous; albumen 0; cotyledons fleshy, connate; radicle small, superior.

SARCOSTIGMA KLEINII, W. & A.; F. B. I. i. 594; Wt. Ic. t. 1854.

W. Gháts, in the Wynaad, Anamalais and Travancore Hills, at low elevations.

A climbing shrub with entire coriaceous oblong-lanceolate leaves up to 10 in. long, prominently reticulate, slender flowering spikes and drupe 1-1·5 in. long.

Family XLIII. AQUIFOLIACEAE.

Trees or shrubs. Leaves alternate, simple, usually coriaceous and evergreen; stipules 0 or 2 minute. *Flowers* regular, small, usually dioecious, ♂ with imperfect ovary, ♀ with imperfect stamens, in axillary cymes fascicles or umbels. *Calyx* persistent, 3-6-lobed, the lobes imbricate. *Petals* 4-5, rarely more, connate below in both ♂ and ♀ or in ♂ only, deciduous, imbricate. *Stamens* isomerous with the petals and alternate with them, inserted on the base of the corolla; filaments subulate; anthers shortly oblong, dorsifixed. *Disk* 0. *Ovary* free, 3-6—or rarely more—celled; ovules 1 or 2 in each cell, collateral, pendulous; style 0 or very short; stigma capitate or discoid. *Fruit* a drupe with 2 or more, 1-seeded, free or connate, stones. *Seed* with a membranous testa; albumen copious, fleshy; embryo minute.

Ilex, Linn.

Trees or shrubs. *Calyx* 4-6-lobed. *Corolla* rotate, petals 4-6, free or connate at the base. *Stamens* isomerous with the petals, adhering to the base of the corolla in ♂, imperfect and often hypogynous in ♀. *Ovary* subglobose, 2-12-celled; stigmas free (usually so in ♂ but ovary imperfect) or confluent on the top of the ovary. *Drupe* usually globose with 2-12 stones; pericarp thick, bony, often grooved.

Leaves entire or rarely with few serratures near the apex, subcoriaceous or almost membranous:—

Flowers usually 6-merous; leaves acute at apex; drupe ·15 in. in diam., tipped by prominent stigmas; large tree.....1. *malabarica*.

Flowers usually 5-merous; leaves coriaceous:—

Leaves elliptic-obovate, 1-2 in. long, mucronate or emarginate at apex, pale beneath, the midrib prominently impressed; small tree with sessile umbellules.....2. *Thwaitesii*.

Leaves elliptic or elliptic-oblongate, acuminate at apex, narrowed at base, 2-3 in. long, the midrib slightly impressed; large tree with subsessile umbellules3. *Wightiana*.
 Leaves ovate-lanceolate, long-acuminate at apex, rounded at base, 2-3 in. long, the midrib slightly impressed; shrub with peduncles about .5 in. long.....4. *Gardneriana*.
 Leaves denticulate-serrate, coriaceous, elliptic, 2-4 in. long; flowers usually 4-merous, ♀ larger than ♂; large tree.....5. *denticulata*.

1. *ILEX MALABARICA*, Bedd. Fl. t. 143; F. B. I. i. 600.

W. Gháts, in Wynaad and lower Nilgiris, Anamalais and Pulneys at about 3,000 ft.

A large tree.

2. *ILEX THWAITESII*, Loesener. *I. Walkeri*, Wt. & Gardn.; F. B. I. i. 600 *in part*.

W. Gháts, in the Pulney Hills.

A small densely branched tree, with small leaves.

3. *ILEX WIGHTIANA*, Wall.; F. B. I. i. 603; Wt. Ic. t. 1216.

W. Gháts, common in the Sholas of the Nilgiri Hills at 6,000-8,000 ft., less so southwards to the Hills of Travancore.

A large handsome tree with white flowers and red berries. Wood greyish-white, soft but useful in building and in turnery. Vern. *Badaga* Horralu; *Tam.* Velloday.

4. *ILEX GARDNERIANA*, Wt. Ic. t. 1217; F. B. I. i. 603.

W. Gháts, in the Nilgiri Hills about Sispara, 6,000 ft., scarce.

A small tree or large shrub.

5. *ILEX DENTICULATA*, Wall.; F. B. I. i. 600; Wt. Ill. t. 142; Bedd. Fl. t. 142.

W. Gháts, Sholas of the Nilgiris, Anamalais and Pulneys at 6,000-8,000 ft.

A large tree, conspicuous in Nilgiri Sholas, by its denticulate leaves and rather large drupes. Wood grey, soft, apt to warp and shrink.

FLORA

OF THE

PRESIDENCY OF MADRAS

BY

J. S. GAMBLE



PART II

CELASTRACEAE TO LEGUMINOSAE-PAPILIONATAE

PUBLISHED UNDER THE AUTHORITY OF THE
SECRETARY OF STATE FOR INDIA IN COUNCIL

LONDON

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LATE OF THE INDIAN FOREST DEPARTMENT

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INTRODUCTION TO PART II.

AFTER the Introduction to Part I was in print, it was found advisable to extend the Part to 200 pages so as to end with a Family and avoid the inconvenience of stopping in the middle of a genus. The present Part, similarly, instead of ending at p. 384, has been extended to p. 390 so as to complete the first Sub-Family of the Leguminosae, and end at a definite point.

Owing to its having, in consequence of the war, been found advisable not to have the valuable Madras collections sent home, the later genera have had to be done at home without them. Fortunately, the Calcutta specimens had already been sent home and were available. It is proposed to continue Part III with such material as is available in this country.

J. S. GAMBLE.

Liss : March 1918.

FLORA OF MADRAS.

Family XLIV. CELASTRACEAE.

Trees or erect or climbing shrubs, sometimes thorny. *Leaves* opposite or alternate, simple; stipules caducous or 0. *Flowers* regular, hermaphrodite or polygamous, usually in dichasia. *Calyx* small, 4-5-lobed, persistent; lobes imbricate. *Petals* 4-5, inserted below the disk or continuous with its margin, imbricate. *Disk* usually conspicuous, flattened or pulvinate, lobed or entire, rarely 0. *Stamens* as many as petals and alternate with them, inserted under on or on the margin of the disk; filaments subulate; anthers 2-celled. *Ovary* on the disk or immersed in it, 2-5-celled; style short or 0; stigma simple or lobed; ovules 1-2 in each cell. *Fruit* capsular or drupaceous. *Seed* usually arillate; albumen fleshy or 0; cotyledons, when present, foliaceous.

Fruit a dehiscent capsule:—

Leaves opposite, rarely alternate:—

Petals free; disk flattened, broad, thick, 4-5-lobed:—

Ovules 2 in each cell; petals not pitted.....1. **Euonymus**

Ovules 1 in each cell; petals pitted.....2. **Glyptopetalum.**

Ovules 4 or more in each cell; petals usually crested

3. **Lophopetalum.**

Petals more or less combined with the annular disk; ovules 2 in each cell 4. **Microtropis.**

Leaves alternate:—

Inflorescence paniculate or racemose:—

Flowers hermaphrodite; large trees; capsule deeply 2-lobed

5. **Kurrimia.**

Flowers polygamous; climbing shrubs; capsule 1-3-celled

6. **Celastrus.**

Inflorescence axillary, cymose; small trees or shrubs, often thorny; capsule 2-3-celled.....7. **Gymnosporia.**

Fruit indehiscent:—

Seeds albuminous, arillate; leaves small, entire; style lateral in fruit.....8. **Pleurostylia.**

Seeds exalbuminous, exarillate; leaves usually crenate; style terminal in fruit 9. **Elaeodendron.**

1. *Euonymus*, Linn.

Trees or shrubs, usually glabrous, sometimes climbing by means of stem rootlets. *Leaves* opposite; stipules deciduous. *Flowers* hermaphrodite, in axillary dichasioid cymes. *Calyx* 4-5-lobed, spreading or recurved, the lobes imbricate. *Petals* 4-5, imbricate. *Stamens* as many as the petals and alternate with them, inserted on the disk; filaments short; anthers broad, 2-celled. *Disk* large, fleshy, 4-5-lobed. *Ovary* sunk in the disk, 3-5-celled; style short, thick; stigma 3-5-lobed; ovules 2 in each cell. *Fruit* a 3-5-celled loculicidal capsule, lobed angled or winged, sometimes echinate; cells 1-2-seeded. *Seeds* enclosed in a fleshy aril; testa thick; albumen copious, oily; cotyledons broad, foliaceous; radicle inferior.

Cymes 1-3-flowered, peduncles and pedicels stout; flowers 4-5 in. in diam., petals fimbriate; leaves entire; capsule-valves deeply obcordate 1. *indicus*.

Cymes 3-7- (rarely 9-) flowered, peduncles and pedicels moderately stout; flowers 3-4 in. in diam.; petals not fimbriate but sometimes crispate; leaves crenulate towards the apex; capsule-valves slightly obcordate 2. *crenulatus*.

Cymes usually more than 7-flowered, peduncles and pedicels slender; flowers usually under 3 in. in diam.; petals entire:—

Leaves entire or nearly so; capsule-valves more or less obcordate, elongate:—

Branchlets terete; flowers 2 in. in diam.; leaves thin, oblong-lanceolate, obtusely acuminate, sometimes obscurely crenate

3. *dichotomus*.

Branchlets quadrangular; flowers 3 in. in diam.; leaves thick, ovate-lanceolate, acute, thickened on the margin, quite entire

4. *angulatus*.

Leaves prominently toothed; branchlets terete:—

Leaves lanceolate, prominently serrate, acuminate; capsule globose 5. *serratifolius*.

Leaves elliptic, crenate-serrate, acute 6. *paniculatus*.

1. *EUONYMUS INDICUS*, Heyne ex Wall.; F. B. I. i. 608; W. & A. 160. *E. Goughii*, Wt. Ic. t. 215.

W. Ghâts, in S. Canara, Coorg, Wynaad and W. Nilgiris at 3,000 ft., rarely higher.

A small tree of the evergreen forests with reddish flowers.

2. *EUONYMUS CRENULATUS*, Wall.; F. B. I. i. 608; W. & A. 161; Wt. Ic. t. 973; Bedd. Fl. t. 144.

W. Gháts, in the Nilgiris, Pulneys and the Hills of Travancore and Tinnevely; common in Nilgiri and Pulney Sholas up to 8,000 ft., apparently at lower elevations in Travancore. A small evergreen tree with reddish flowers and a brownish-white, hard, close-grained wood.

3. *EUONYMUS DICHOTOMUS*, Heyne ex Wall.; F. B. I. i. 609; W. & A., 160.

W. Gháts, in the Anamalai, Pulney and Tinnevely Hills, up to 4,500 ft., Travancore.

A small evergreen tree with pale green flowers and drooping habit, sometimes planted in Travancore. Vern. *Tam. Vini*.

4. *EUONYMUS ANGULATUS*, Wt. Ic. t. 1,053; F. B. I. i. 610.

W. Gháts, in Coorg, Nilgiris below Sispara, about 5,000 ft., Bolampatti Hills of Coimbatore, in evergreen forest.

A small tree with dull purple flowers, the margins of the leaves thickened.

5. *EUONYMUS SERRATIFOLIUS*, Bedd.; F. B. I. i. 609; Bedd. Ic. t. 171.

W. Gháts of S.-E. Wynaad and Malabar (Carcoor Ghát) at 3,000–5,000 ft., Hills of Travancore.

A shrub or small evergreen tree.

6. *EUONYMUS PANICULATUS*, Wight; F. B. I. i. 609. *E. crenulatus* var. *laxiflora*, Wt. Ic. t. 214 and t. 973 (letterpress).

W. Gháts, in the Sivagiri Hills of Tinnevely.

2. *Glyptopetalum*, Thwaites.

Erect shrubs or small trees. *Leaves* opposite or subalternate, exstipulate. *Flowers* in axillary or extra-axillary, dichasioid cymes, sometimes reduced to 3 flowers only. *Calyx* small, 4-lobed. *Petals* 4, with 2 pit-like depressions on the upper surface. *Disk* large, quadrangular. *Stamens* 4, inserted at the angle of the disk, connective enlarged; anther-cells divergent. *Ovary* immersed in the disk, 4-lobed, 4-celled; style short; stigma minute; ovule 1 in each cell, pendulous. *Fruit* a loculicidal 1–4-celled and -seeded subglobose capsule, the walls coriaceous. *Seed* more or less covered by a red fleshy aril; testa thick; albumen fleshy, cotyledons flat, leafy; radicle superior.

Cyme-peduncles 1-1·5 in. long, 5-7-flowered; capsule small, under ·5 in. in diam. :—

Leaves membranous, ovate-lanceolate, serrate except at the very base, acute at apex, cuneate at base, 4-6 in. long, 1·5-2·5 in. broad, nerves slender, hardly prominent; petals oblong, about ·2 in. long, the pits near the apex.....1. *zeylanicum*.

Leaves coriaceous, elliptic-obovate, entire or with few serratures at apex, more or less obtuse at apex, cuneate at base, 2-3·5 in. long, 1-2·5 in. broad, nerves thick, prominent; petals ovate, obtuse, about ·1 in. long, pits oblique2. *Lawsonii*.

Cyme-peduncles 3-6 in. long, 3-flowered; capsule large, about ·75-1 in. in diam.; leaves thinly coriaceous, elliptic-oblong, entire, 4-6 in. long, 2-2·5 in. broad; petals obovate, ·3-·4 in. long, without or with obscure pits3. *grandiflorum*.

1. GLYPTOPETALUM ZEYLANICUM, Thw.; F. B. I. i. 612.

W. Gháts, Anamalai Hills and Hills of Tinnevely and Travancore at 2,000-3,000 ft.

A large shrub or small tree, with white hard wood.

2. GLYPTOPETALUM LAWSONII, Gamble in Kew Bull. 1916, 131.

W. Gháts, N. slopes of Nilgiris at low elevations (Wight, Lawson), Geddesala Ghát in Coimbatore (A.W. Lushington).

A large shrub or small tree, with prominently-nerved coriaceous leaves.

3. GLYPTOPETALUM GRANDIFLORUM, Bedd. Ic. t. 102; F. B. I. i. 613.

W. Gháts, in Sholas below Devala, S.-E. Wynaad, at 2,000-3,000 ft.

A large shrub with oblong entire leaves, large flowers on long peduncles and a large, pale, smooth, rounded, usually 4-seeded capsule.

3. *Lophopetalum*, Wight.

Trees or shrubs. *Leaves* opposite or alternate, exstipulate. *Flowers* rather large, hermaphrodite, in axillary or terminal dichasioid cymes. *Calyx* broadly flattened at the base; lobes 5, broad, obtuse, very short. *Petals* 5, continuous with the disk, persistent, the upper surface usually cristate or lamellate. *Disk* large, flat, 5-lobed. *Stamens* 5, inserted on the disk; filaments

subulate; anthers oblong. *Ovary* small, immersed in the disk and continuous with it, triquetrous; style short; stigma capitate; ovules 4 or more in each cell, in 2 series. *Fruit* a coriaceous 3-4-angled, 3-4-celled, loculicidal capsule. *Seeds* few or many, rarely winged, arillate; albumen fleshy; embryo small.

LÖPHOPETALUM WIGHTIANUM, Arn.; F. B. I. i. 615; Wt. Ic. t. 162; Bedd. Fl. t. 145.

W. Gháts, in evergreen forests and on river banks at low elevations and up to 3,000 ft., from S. Canara southwards.

A lofty evergreen tree, with oblong, entire, abruptly acuminate leaves up to 6 in. long, dull reddish flowers and capsule 4 in. long, sharply triangular in section; seeds thin, 2 in. long. Bark smooth, mottled brown and white; wood reddish-grey, close-grained, useful in carpentry, but not durable. Vern. *Tam.* Venkottei; *Mal.* Venkotta; *Kan.* Balpalé.

4. Microtropis, Wall.

Trees or shrubs, glabrous, evergreen. *Leaves* opposite, entire, exstipulate. *Flowers* in sessile clusters or peduncled dichasioid cymes, axillary or supra-axillary, sometimes unisexual. *Sepals* 5, imbricate, often unequal. *Petals* 5, more or less connate at the base with the back of the disk. *Disk* annular, sometimes 0. *Stamens* 5, inserted on the disk. *Ovary* free, ovoid or conical, imperfectly 2-3-celled; style short; stigma minutely 2-4-lobed; ovules 2 in each cell, collateral. *Fruit* an ovoid or oblong, 1-celled, 2-valved, 1-seeded capsule, surrounded at the base by the persistent calyx. *Seed* erect, oblong; testa more or less fleshy; albumen thickly fleshy; cotyledons foliaceous; radicle cylindric, inferior.

Flowers sessile, clustered at the axils of the leaves or of fallen leaves:—

Leaves scarcely coriaceous, elliptic or oblanceolate, obtusely acute at apex, long-attenuate at base, 1·5-4 in. long, 1-2 in. broad; flowers very small, in clusters under ·3 in. in diam; capsule ·5-·7 in. long; branchlets yellowish, youngest darker1. *Wallichiana*.
Leaves coriaceous, elliptic or somewhat oblanceolate, obtusely acute at apex, cuneate at base, margins reflexed, nerves prominent on lower less so on upper surface, 3-6 in. long, 1-2·5 in. broad; flowers small, in clusters about ·5 in. in diam.; capsule oblong, ·7-8 in. long; branchlets black-purple.....2. *Stockii*.

Leaves very coriaceous, margins thickened; branchlets black-purple, rough :—

Leaves elliptic-ovate, acuminate at apex, cuneate to almost rounded at base, prominently rugulose above, the nerves obscure on both surfaces, 4–7 in. long, 2–4·5 in. broad; flowers small, in clusters 5–6 in. in diam.; capsule ellipsoid, 7 in. long 3. *latifolia*.

Leaves broadly elliptic or obovate, rounded or slightly emarginate at apex, rounded or subcordate at base, margins revolute, cucullate, slightly rugulose above, 2–5 in. long, 1–2·5 in. broad; flowers small, in clusters 6 in. in diam.; capsule cylindric when young, ellipsoid when old, channelled, 8 in. long

4. *ramiflora*.

Flowers in axillary or extra-axillary peduncled cymes; leaves more or less elliptic, obtuse :—

Peduncles very short, 3–4 in. long, stout; cyme-branches short; leaves up to 3 in. long 1·5 in. broad; capsule narrowly oblong, 75 in. long. 5. *densiflora*.

Peduncles 6–1·5 in. long, slender :—

Leaves when dry olive-grey, usually under 2 in. long; petals orbicular, not clawed, scarcely adherent to the narrow disk; stamen-filaments short, anthers orbicular, large; seed testa rusty-brown (Wt.) 6. *microcarpa*.

Leaves when dry greenish-brown, dark above, pale beneath, usually 2–3 in. long; petals long-clawed, the claws adherent to the rather broad disk; stamen-filaments subulate, anthers ovoid; seed testa crimson (Wt.) 7. *ovalifolia*.

1. *MICROTROPIS WALLICHIANA*, Wt.; F. B. I. i. 613.

W. Gháts, Sampagi Ghát, Coorg (Beddome), evergreen forests of Travancore about 4,000 ft. (Bourdillon).

A small tree about 30 ft. high.

2. *MICROTROPIS STOCKSII*, Gamble in Kew Bull. 1916, 132.

W. Gháts, in Coorg (Hohenacker), Nilgiris, Anamalai Hills (Barber); Tinnevely Hills at 5,000 ft. (Beddome); Concan (Stocks).

A small tree with blackish branches and leaves pale and reticulate beneath.

3. *MICROTROPIS LATIFOLIA*, Wt.; F. B. I. i. 613.

W. Gháts, in Malabar, W. Nilgiris, Bolampatti Hills, at 2,000–6,000 ft.

A small tree of evergreen forests with very thick rugulose leaves, obscurely nerved.

4. *MICROTROPIS RAMIFLORA*, Wt. Ic. t. 977; F. B. I. i. 613.

W. Gháts, in Shola forests of the Nilgiris and Pulneys at 6,000–8,000 ft.

A moderate-sized tree, common about Ootacamund and Coonoor.

5. *MICROTROPIS DENSIFLORA*, Wt. Ic. t. 1052; F. B. I. i. 614.

W. Gháts, on the W. slopes of the Nilgiris, scarce.

6. *MICROTROPIS MICROCARPA*, Wt. Ic. t. 975; F. B. I. i. 614.

W. Gháts, common in Shola forests of the Nilgiris and Pulneys at 6,000–8,000 ft.

An evergreen shrub or small tree, with a grey, soft wood. Leaves usually small, but occasionally found up to 4 in. long by 2 in. broad.

7. *MICROTROPIS OVALIFOLIA*, Wt. Ic. t. 976; F. B. I. i. 614.

W. Gháts, in the Shola forests of the Nilgiris at 6,000–8,000 ft.

An evergreen shrub or small tree, closely allied to the preceding and hardly separable from it, but considered quite distinct by Wight.

5. *Kurrimia*, Wall.

Trees. *Leaves* alternate, glabrous, towards the end of the branchlets, nerves parallel as also the transverse nervules; stipules large, deciduous except at the terminal bud. *Flowers* hermaphrodite, in axillary, simple or paniculate, racemes. *Calyx* 5-lobed. *Petals* 5, spreading or recurved. *Disk* fleshy, entire or 5-lobed. *Stamens* 5, inserted under or on the margin of the disk; filaments subulate; anthers ovate, the cells opening by vertical slits. *Ovary* ovoid, seated on the disk, 2-celled; styles 2 (rarely 3), slender; stigmas small, capitate; ovules 2 in each cell, erect. *Fruit* a leathery deeply 2-lobed capsule, each lobe 2-valved, 1-seeded; one lobe frequently abortive. *Seeds* large, thick-stalked, covered completely or partially by a fleshy aril; testa coriaceous, smooth; albumen fleshy; cotyledons small, flattened; radicle inferior.

KURRIMIA INDICA, Gamble n. comb. *K. bipartita*, Lawson; F. B. I. i. 622. *Trochisandra indica*, Bedd. Fl. t. 120.

W. Gháts, in the Anamalai Hills and Hills of Tinnevely and Travancore, in evergreen forests, at 3,000–6,000 ft.

A very large tree with coriaceous conspicuously-nerved large leaves, pale yellow flowers and a capsule with 2 oblong equal (when both fertile) lobes 1.5 in. long. The wood is pale greyish-brown and moderately hard. Vern. *Tam.* Kadaplá.

6. *Celastrus*, Linn.

Climbing unarmed shrubs. *Leaves* alternate, entire or crenulate; stipules 0 or minute and deciduous. *Flowers* polygamous, in terminal or axillary racemes or panicles. *Calyx* 5-lobed, lobes imbricate. *Petals* 5, spreading. *Disk* broad, concave, 5-lobed. *Stamens* 5, inserted on the margin of the disk, in ♀ more or less rudimentary; filaments short; anthers oblong. *Ovary* in ♂ flowers rudimentary, conical, 3-lobed; in ♀ flowers globose, 3-celled; style short, thick; stigmas 3, recurved; ovules 2 in each cell, collateral, erect. *Fruit* a globose or ovoid, 1–3-celled, loculicidal capsule, 1–6-seeded. *Seeds* erect, enclosed in a fleshy aril; testa-chartaceous; albumen copious, fleshy; embryo erect with leafy cotyledons.

CELASTRUS PANICULATA, Willd.; F. B. I. i. 617; W. & A. 158; Wt. Ill. t. 72, Ic. t. 158.

In all Districts, chiefly in deciduous forests.

A large climbing shrub with ovate or obovate crenulate leaves, small white flowers in pendent panicles and yellow capsules opening to show the brown seeds covered with a scarlet aril. Vern. *Hind.* Malkagni; *Ur.* Korsano; *Kan.* Kariganne; *Tam.* Valuluvai.

7. *Gymnosporia*, W. & A.

Shrubs or small trees, usually thorny. *Leaves* alternate, exstipulate. *Flowers* hermaphrodite, in axillary, solitary or fascicled dichotomous cymes, sometimes on the thorny branchlets. *Calyx* 4–5-lobed. *Petals* 4–5, spreading. *Disk* broad, lobed or sinuate. *Stamens* as many as petals, inserted below the disk; filaments slender; anthers broad. *Ovary* attached by a broad base to or sunk in the disk, 2–3-celled; style usually short; stigmas 3, capitate or spreading; ovules 2 in each cell. *Fruit* a globose or obovoid 2–3-celled 1–4-seeded capsule. *Seeds* usually arillate,

rarely exarillate; testa coriaceous; albumen fleshy; cotyledons foliaceous; radicle inferior.

Aril of seed thin, membranous:—

Aril embracing about half of the seed or more, sometimes 0; leaves obovate, obtuse, minutely crenate, grey when dry; flowers minute, in cymes under 1 in. long; capsules globose, .2 in. in diam.

1. *montana*.

Aril usually embracing nearly the whole seed; leaves ovate-lanceolate, obtusely acute, minutely crenate-serrate, reddish when dry; flowers rather large, in capillary cymes about 1 in. long fascicled on the branches; capsules obovoid; .3 in. in diam. 2. *rufa*.

Aril of seed fleshy, embracing only the base of the seed:—

Leaves lanceolate, acuminate, up to 6 in. by 2 in.; capsule obcordate, .3 in. by .4 in. 3. *acuminata*.

Leaves ovate, obtusely acute, up to 4 in. by 2.5 in.:—

Flowers large, in panicled cymes up to 4 in. long; capsule slightly obcordate, nearly .5 in. long; leaves serrate, cuneate at base

4. *Heyneana*.

Flowers very small. Cymes up to 1.5 in. long; capsule obovoid, .4–.5 in. long; leaves crenulate, reticulate, rounded or subcordate

5. *ovata*.

Leaves obovate, entire, emarginate, 1–2 in. long; flowers very small, in fascicles .5 in. long; capsule pale, slightly obcordate, .3 in. long!..... 6. *emarginata*.

Aril flat, very small, attached to the base of the seed; leaves obovate, obtuse or emarginate, crenate, cuneate at base; flowers small, in fascicles of cymes under 1 in. long; capsule large, slightly obcordate, .5 in. long..... 7. *Wallichiana*.

1. GYMNOSPORA MONTANA, Benth.; F. B. I. i. 621. *Celastrus montana*, W. & A. 159; Wt. Ic. t. 382.

N. Circars and Deccan, common in dry forests; N. slopes of Nilgiris.

A small tree or large shrub with prominent straight thorns often bearing leaves and flowers. Wood light reddish-brown, close-grained. Vern. *Hind.* Baikar; *Tel.* Danti; *Kan.* Tandrasī.

2. GYMNOSPORA RUFA, Lawson; F. B. I. i. 620.

E. Ghāts, in Ganjam and Vizagapatam, up to 4,500 ft. on Mahendragiri; Hills of N. Coimbatore.

A small tree with few straight thorns and red close-grained wood.

3. GYMNOSPORA ACUMINATA, Hook. f.; F. B. I. i. 619.

E. Gháts, Mahendragiri Hill in Ganjam at 4,500 ft. (Gamble); Hills of Vizagapatam at 3,500–4,500 ft. (A. W. Lushington).

A large shrub with small straight sharp thorns and rather thin leaves.

4. GYMNOSPORA HEYNEANA, Lawson; F. B. I. i. 620. *Celastrus Heyneana*, W. & A. 159.

W. Gháts, in N. Nilgiris, Pulneys and Travancore Hills, in dry deciduous forest.

A shrub with rather large leaves, rather large flowers, and few straight stout thorns. Vern. *Tam.* Nandunarai.

5. GYMNOSPORA OVATA, Lawson; F. B. I. i. 619, *Celastrus ovata*, Wall.; W. & A. 159.

W. Gháts, in the Nilgiri and Pulney Hills at 3,000–6,000 ft., most frequent in Nilgiris, N. slopes.

An unarmed shrub with coriaceous, ovate or orbicular leaves and very small flowers, in dense fascicles ½ to 1½ in. long.

6. GYMNOSPORA EMARGINATA, Lawson; F. B. I. i. 621. *Celastrus emarginata*, Willd.; W. & A. 160.

N. Circars, Deccan and Carnatic, in dry deciduous forests, often on laterite, extending west to the slopes of the Nilgiris and Anamalais.

A shrub with pale leaves, long straight thorns frequently bearing leaves and flowers, whitish-grey bark and white hard wood. Vern. *Ur.* Gouro kosai; *Tel.* Chinta.

7. GYMNOSPORA WALLICHIANA, Lawson; F. B. I. i. 621. *Celastrus Wallichiana*, W. & A. 159.

Deccan, in Mysore (G. Thomson); S. Carnatic, in the Tinnevely Hills (Wight, Barber, Fischer).

A shrub with zigzag branches and long straight thorns frequently bearing leaves and flowers.

8. *Pleurostyli*a, W. & A.

Shrubs or small trees. *Leaves* opposite, entire, coriaceous, exstipulate. *Flowers* in axillary few-flowered cymes. *Calyx* 5-lobed, very small. *Petals* 5. *Disk* thick, crenulate. *Stamens* 5, attached below the margin of the disk; filaments short, flat; anthers with the connective broad at the back. *Ovary* half

immersed in the disk, 1-2-celled; style short, thick; stigma broad, peltate; ovules 2 in each cell, collateral. *Fruit* indehiscent, 1-2-celled, marked on one side by the remains of the style. *Seed* 1, rarely 2, erect, covered by the arillus-like testa; albumen fleshy; cotyledons flat; radicle inferior.

PLEUOSTYLIA WIGHTII, W. & A. 157; F. B. I. i. 617; Wt. Ic. t. 155. *P. Heynei*, W. & A. 157.

N. Circars, in dry forests of Vizagapatam and Godavari; Deccan, in Cuddapah, Mysore and Coimbatore; W. Gháts, in the drier forests of N. Nilgiris, Travancore and Tinnevely.

A small evergreen tree with small somewhat obovate leaves, minute flowers and small white ovoid fruit. Bark grey, tessellated in small squares; wood light red or greyish, hard, used in Cuddapah to make combs. Vern. *Tam.* Chiru piyari, Karuvali; *Tel.* Piyari.

9. Elaeodendron, Jacq. f.

Trees or shrubs. *Leaves* opposite or subopposite, entire or crenate; stipules minute, caducous. *Flowers* hermaphrodite, sometimes polygamous, in axillary dichasioid corymbose cymes. *Calyx* 5-lobed; lobes often unequal, imbricate. *Petals* 5, spreading. *Disk* thick, cushion-like, margin sinuate. *Stamens* 5, inserted into the margin of the disk; filaments slender, at length recurved; anthers subglobose. *Ovary* adnate to the disk, conical, 2-5-celled; style short; stigma small; ovules 2 in each cell. *Fruit* an indehiscent drupe, dry or succulent; stones 1-3-celled, cells 1-, rarely 2-seeded. *Seeds* erect, exarillate; testa membranous or spongy; albumen 0; cotyledons thick, fleshy; radicle inferior.

Leaves ovate or elliptic, sometimes obovate, obtuse or acute, usually pale grey when dry, entire or shallowly crenate; flowers .25 in. in diam. in slender cymes usually under 2 in. long, sometimes 3 in.

1. glaucum.

Leaves lanceolate or oblanceolate, obtusely acuminate, reddish-brown or almost black when dry, broadly and deeply crenate; flowers .4 in. in diam. in rather stout cymes usually 4 in. long 2. paniculatum.

1. ELAEODENDRON GLAUCUM, Pers.; F. B. I. i, 623 *in part.* *E. Roxburghii*, W. & A. 157; Wt. Ill. t. 71; Bedd. Fl. t. 148.

Deciduous forests in most forest Districts of N. Circars, Deccan and Carnatic, also on W. Coast.

A graceful tree with a grey bark and light brown close-grained wood, useful for cabinet work. Vern. *Hind.* Jamrásí; *Tel.* Nirija; *Tam.* Karuváli.

2. *ELAEODENDRON PANICULATUM*, W. & A. 157. *E. glaucum*, Pers. F. B. I. i. 623 *in part*.

W. Gháts, N. slopes of Nilgiri and Anamalai Hills up to 3,000 ft.

A large tree.

Family XLV. HIPPOCRATEACEAE.

Small trees or erect or climbing shrubs. *Leaves* opposite or alternate, simple, somewhat coriaceous. *Flowers* usually very small, in axillary dichotomous cymes. *Calyx* 5-lobed, lobes imbricate. *Petals* 5, inserted under the disk, imbricate or valvate. *Disk* fleshy, cupshaped, sometimes ringed at the base. *Stamens* 3, inserted on or within the top of the disk, at first erect, then recurved. *Ovary* more or less sunk in the disk, 3-celled; style 1; stigmas 1-3; ovules 2 or more in each cell, on an axile placenta. *Fruit* of samaroid carpels or fleshy and 1-3-celled. *Seeds* usually many, often angular, sometimes winged; albumen 0; embryo straight; cotyledons fleshy.

Fruit samaroid, flattened, dehiscent, the seeds winged below

1. **Hippocratea.**

Fruit globose, indehiscent, seeds not winged.....2. **Salacia.**

1. **Hippocratea**, Linn.

Climbing shrubs. *Leaves* opposite, petioled, more or less crenate-serrate; stipules small, caducous. *Flowers* in axillary, rarely terminal, cymes or panicles, white or greenish. *Calyx* small, 5-lobed. *Petals* 5, spreading, imbricate or valvate. *Disk* cylindric or cuplike. *Stamens* 3, at first erect, then recurved, inserted on or within the top of the disk; filaments dilated at base; anthers 2-celled, cells opening transversely. *Ovary* 3-celled, sunk in the disk; style short; stigmas 1-3; ovules 2-seriate, 2-10 in each cell, on the inner angle. *Fruit* of three flattened carpels, connate below, each 2-valved or indehiscent. *Seeds* compressed, usually winged below; albumen 0; embryo with fleshy connate cotyledons; radicle inferior.

Flowers .3-.5 in. in diam. :—

Petals triangular lanceolate, valvate; leaves under 4 in. long :—

Petals not mucronate at back, glabrous within; leaves subcoriaceous, elliptic-ovate or -obovate, attenuate at base, margins not recurved; samaras obovate, emarginate, striate, 1.5-2 in. long, broad.....1. *obtusifolia*.

Petals mucronate at back, puberulous within; leaves coriaceous, oblong, rounded at base, margins recurved; samaras not yet known 2. *Bourdillonii*.

Petals orbicular, with a narrow claw, imbricate; leaves coriaceous, elliptic, up to 7 in. long; samaras oblanceolate, narrow, obtuse, striate, up to 3 in. long 3. *Arnottiana*.

Flowers .2 in. in diam.; leaves membranous, under 2 in. long; samaras 1.5 in. long, narrow, acute 4. *indica*.

1. HIPPOCRATEA OBTUSIFOLIA, Roxb.; F. B. I. i. 623; W. & A. 104.

E. Coast, from Nellore to Tanjore in sandy forest tracts; Deccan, in dry forests of Cuddapah and Kurnool, extending to E. slopes of Nilgiri and Pulney Hills; W. Coast, scarce.

A climbing shrub with corky bark and wood of peculiar structure. Vern. *Mar. Danshir*.

2. HIPPOCRATEA BOURDILLONII, Gamble in Kew Bull. 1916, 132.

Travancore, near Colatoorpolay, 300 ft. (Bourdillon).

A climbing shrub.

3. HIPPOCRATEA ARNOTTIANA, Wt. Ill. t. 46-47; F. B. I. 624.

W. Coast and W. Gháts forests from S. Canara to Malabar and Travancore.

A climbing shrub with rather large leaves and long, narrow samaras, at once recognized by the orbicular clawed petals.

4. HIPPOCRATEA INDICA, Willd.; F. B. I. i. 624; Roxb. Cor. Pl. ii. 130; W. & A. 104.

N. Circars, in Vizagapatam; Carnatic, in S. Arcot and Tanjore; E. slopes of W. Gháts, in Coimbatore, Madura and Tinnevely.

A climbing shrub with rather small leaves and small fruit samaras.

2. *Salacia*, Linn.

Small trees or climbing or sarmentose shrubs. *Leaves* opposite, rarely alternate, exstipulate. *Flowers* small, axillary or extra-axillary, in fascicles or cymes. *Calyx* small, 5-lobed. *Petals* 5, imbricate. *Disk* thick, broad. *Stamens* 3, inserted on the inner margin of the disk; filaments at length recurved, usually broadened at base. *Ovary* conical, more or less sunk in the disk, 3-celled; style very short; stigma capitate or 3-lobed; ovules 2-8 in each cell in 1-2 series. *Fruit* an indehiscent 1-3-celled berry; rind usually coriaceous. *Seeds* large, angular; testa thick; albumen 0; cotyledons thick, usually conferruminate; radicle inferior.

Flowers fascicled on axillary tubercles; ovary enclosed in the disk; anther-cells dehiscing transversely:—

Calyx-lobes not fringed:—

Petals clawed at the base; pedicels .15-.2 in. long; branchlets more or less angled; leaves elliptic-lanceolate, crenate-serrate, up to 3 in. long; fruit small.....1. *prinoides*.

Petals broad at the base; branchlets more or less prominently lenticellate, terete:—

Pedicels .25 in. long; petals .15 in. long, thick; calyx-lobes short, obtuse; leaves coriaceous, ovate- or obovate-oblong, reticulate, 2.5 to 3.5 in. long by 1.5-2 in. broad; fruit large, tuberculate.....2. *reticulata*.

Pedicels .5 in. long; petals .1 in. long, with white margins; calyx-lobes short, ovate; leaves chartaceous, oblong, 4-6 in. long by 1.5-2 in. broad.....3. *malabarica*.

Calyx-lobes fringed; pedicels very short; branchlets lenticellate; leaves coriaceous:—

Leaves elliptic-oblong or -ovate, 2-3 in. long by 1.5 in. broad, main nerves irregular, oblique; calyx-lobes shortly fringed; fruit large, smooth.....4. *macrosperma*.

Leaves elliptic oblong, 5-6 in. long by 2-2.5 in. broad, main nerves regular, nearly horizontal; calyx-lobes long and prominently fringed.....5. *Beddomei*.

Flowers in axillary pedunculate heads or branching cymes; anther-cells dehiscing longitudinally:—

Peduncles very short; ovary elongate, conical, much exsert from the disk; leaves elliptic-oblong or -oblanceolate, yellowish when dry; calyx-lobes entire; fruit large, tuberculate.....6. *oblonga*.

Peduncles elongate, slender; cymes up to .5 in. long, often much branched, many-flowered; ovary rounded, partly exsert from the disk; calyx-lobes minutely ciliate; petals usually with white margins; leaves ovate or lanceolate, obtusely acuminate, 2-4 in. long by 1-2 in. broad, greyish when dry; branchlets rough

7. *fruticosa*.

1. SALACIA PRINOIDES, DC.; F. B. I. i. 626; W. & A. 105.
Hills of the N. Circars in Ganjam and Vizagapatam.
A straggling shrub.
2. SALACIA RETICULATA, Wt. Ill. i. 134; F. B. I. i. 627.
W. Coast, at Quilon in Travancore.
A climbing shrub with large tuberculate fruit.
3. SALACIA MALABARICA, Gamble in Kew Bull. 1916, 133.
W. Coast, S. Canara to Travancore, in the plains, in moist forest.
A large climber.
4. SALACIA MACROSPERMA, Wt. Ic. t. 962; F. B. I. i. 628.
W. Gháts, in Wynaad and W. Nilgiris, up to 5,000 ft.
A rambling shrub.
5. SALACIA BEDDOMEI, Gamble in Kew Bull. 1916, 133.
W. Gháts, in the Anamalais (Beddome).
6. SALACIA OBLONGA, Wall.; F. B. I. i. 628; W. & A. 106;
Wt. Ill. t. 47B, Ic. t. 97.
W. Gháts, from the Nilgiris to Tinnevely, E. slopes, up to 3000 ft.
A climbing shrub or small tree.
7. SALACIA FRUTICOSA, Lawson; F. B. I. i. 628.
W. Gháts, in almost all Districts from S. Canara to Travancore and up to 4,000 ft., in evergreen forest.
A climbing shrub.

Family XLVI. RHAMNACEAE.

Trees or shrubs, erect or climbing; branches sometimes thorny, sometimes bearing tendrils. *Leaves* simple, alternate subopposite or opposite, usually coriaceous, often 3-5-ribbed; stipules small or 0, sometimes changed into prickles. *Flowers* hermaphrodite or polygamous, small, greenish, in lax or dense axillary cymes, solitary or disposed in spikes or panicles. *Calyx* 4-5-lobed, the lobes triangular, valvate, usually keeled within. *Petals* 4-5

rarely 0, inserted on the throat of the calyx-tube and shorter than its lobes, cucullate, often clawed. *Disk* fleshy and filling the calyx-tube or membranous and lining it, glabrous or tomentose. *Stamens* as many as and opposite to the petals, often enclosed within them; anthers 2-celled, dehiscing longitudinally, rarely laterally. *Ovary* sessile, free or immersed in the disk, 3- rarely 2- or 4-celled; style short, simple or 2-4-lobed; stigmas terminal, usually capitate. *Fruit* superior or inferior, 3-, rarely 4-celled, free or girt more or less by the adnate calyx-tube, capsular or a dry or fleshy drupe, sometimes winged. *Seeds* solitary in each cell, erect, usually compressed; albumen fleshy, scanty or rarely 0; embryo large, the cotyledons flat.

Fruit superior or only partly enclosed in the calyx-tube:—

Fruit 1-seeded, the style enlarged in a linear-oblong wing; unarmed climbing shrubs; seeds exalbuminous.....1. **Ventilago**.

Fruit a dry or fleshy drupe with 1-4-seeded stone; armed or unarmed trees or shrubs with 3-5-ribbed leaves; seeds with scanty albumen or none.....2. **Zizyphus**.

Fruit baccate with 2-4 pyrenes; seeds albuminous, the albumen often thin:—

Disk thin, lining the calyx-tube; trees or shrubs usually unarmed, leaves alternate.....3. **Rhamnus**.

Disk fleshy, filling the calyx-tube; leaves opposite or subopposite:—

Glabrous shrub with many sharp hooked thorns and small coriaceous shining leaves; flowers in axillary fascicles or umbels.....4. **Scutia**.

Straggling, more or less pubescent, shrubs with few but often large thorns; leaves rather large, chartaceous; flowers in spicate panicles.....5 **Sageretia**.

Fruit when ripe capsular; leaves alternate; unarmed, erect or sarmentose shrubs; flowers in short axillary cymes...6. **Colubrina**.

Fruit inferior, crowned with the persistent calyx; climbing shrubs with tendrils:—

Fruit of 3 winged indehiscent mericarps; flowers in spikes or racemes; disk lobed between the stamens.....7. **Gouania**.

Fruit of 3 ovoid dehiscent cocci; flowers in axillary pedunculate umbels; disk merely angular.....8. **Helinus**.

1. *Ventilago*, Gaertn.

Climbing shrubs. *Leaves* alternate, bifarious, usually crenate; stipules very small, caducous. *Flowers* small, in axillary or terminal panicles, rarely fascicles; bracteoles many, small. *Calyx* 5-lobed; lobes spreading, keeled within. *Petals* 5, deltoid or obcordate, cucullate. *Stamens* 5, adnate to the base of the petals and opposite to them; connective of anthers thickened and produced above. *Disk* flattened, 5-angled. *Ovary* sunk in the disk, 2-celled; style very short; stigmas 2, short; ovules solitary in each cell. *Fruit* a subglobose, 1- (rarely 2-) seeded nut, prolonged above by the style enlarged in a linear-oblong coriaceous wing, ending in the remains of the stigmas, the base more or less enclosed in the adherent calyx-tube. *Seed* subglobose; testa thin; albumen 0; cotyledons thick, fleshy.

Flowers in axillary and subterminal panicles:—

Calyx-tube adnate to the lower part of the nut:—

Branchlets stout, grey-puberulous; leaves ovate or elliptic-ovate, usually unequally rounded at base, 3-6 in. long by 1.5-3 in. broad; panicles dense, flowers rather large, disk villous; nut and its wing yellow-pubescent, the calyx-tube covering more than half the nut.....1. *calyculata*.

Branchlets rather slender, minutely puberulous; leaves oblong-lanceolate, subobtuse, attenuate at base, 2-3 in. long by about 1 in. broad; panicles slender, flowers small, disk glabrous or nearly so; nut and its wing greyish, the calyx-tube covering about one-third of the nut.....2. *Goughii*.

Calyx-tube adnate only to the base of the nut; disk glabrous or nearly so:—

Branchlets slender, usually pale; leaves ovate or ovate-lanceolate, obtuse or acute, 1.5-3.5 in. long by 1-1.5 in. broad; panicles minutely grey-pubescent, flowers small; nut with grey nearly glabrous wing, the calyx-tube small, adnate to the base of the nut.....3. *maderaspatana*.

Branchlets stout, dark; leaves oblong-lanceolate, long-acuminate, strongly crenate, 2.5-4 in. long, by 1-1.5 in. broad; panicles long-golden-villous pubescent, flowers very small; nut with brown tomentose wing, the calyx-tube saucer-like, embracing the base of the nut.....4. *lanceolata*.

Flowers in axillary fascicles; branchlets slender, pubescent; leaves oblong, 1.5-4.5 in. long by 0.5-1.5 in. broad; disk slightly villous;

calyx-tube saucer-like, embracing the base of the nut, wings with golden-velvety pubescence.....5. *bombaiensis*.

1. *VENTILAGO CALYCVLATA*, Tul.; F. B. I. i. 631. *V. maderaspatana* var. β ; W. & A. 164.
N. Circars, from Ganjam to Godavari in forest tracts; Deccan, in Kurnool forests; W. Coast, in dry forests of Malabar and E. Nilgiris.
A large and conspicuous forest climber. Vern. *Tel.* Surati chekka.
2. *VENTILAGO GOUGHII*, Gamble in Kew Bull. 1916, 134.
W. Gháts in Coorg and Nilgiris (Gough, Lawson).
A climbing shrub.
3. *VENTILAGO MADERASPATANA*, Gaertn.; F. B. I. i. 631; Wt. Ic. t. 163; W. & A. 164, var. *a*.
Deccan forests from Kistna to Mysore and Coimbatore; W. Gháts, chiefly on E. slopes.
A climbing slender shrub. The root bark gives a dye. The leaves are very variable in shape, but always distinguishable from those of *V. calyculata* both in size and venation. Vern. *Tel.* Surati chekka; *Tam.* Vempadam.
4. *VENTILAGO LANCEOLATA*, Gamble in Kew Bull. 1916, 134.
W. Gháts, in Malabar and Tinnevely (Barber, Lawson).
A climbing shrub with nearly black branches.
5. *VENTILAGO BOMBAIENSIS*, Dalz.; F. B. I. i. 631; Bedd. Ic. t. 114 (under *Zizyphus wynadensis*, Bedd. corrected in Index p. iii).
Moist woods in Wynaad at 3,000 ft. (Beddome).

2. *Zizyphus*, Juss.

Trees or erect or climbing shrubs, usually armed with sharp straight or hooked thorns, which are transformed stipules thorns solitary or in pairs, usually one straight, the other curved. *Leaves* alternate, subdistichous, 3-5-ribbed. *Flowers* small, greenish or yellowish, in axillary fascicles or in sessile or peduncled cymes. *Calyx* with broadly obconic tube and 5 triangular acute lobes keeled within, lobes valvate. *Petals* 5, or rarely 0, cucullate, deflexed. *Stamens* 5, opposite to and enclosed in the petals and usually longer than them. *Disk* 5-10-lobed, flat or pitted, the margin free. *Ovary* sunk in or adnate at the

base to the disk, 2-4-celled; styles 2-3, rarely 4, free or connate; stigmas small, papillose. *Fruit* a globose or oblong drupe, with a woody or bony 1-4-celled and -seeded stone. *Seed* plano-convex; albumen 0 or scanty; cotyledons thick; radicle short.

Petals 5; stone hard and thick, more or less rugose:—

Styles 2; flowers in fascicles or sessile or short-peduncled cymes:—

Erect trees or shrubs:—

Armed:—

Small tree, usually with short thick bole and rounded head; leaves ovate-elliptic, up to 2.5 in. long by 1.5 in. broad, fuscous-tomentose beneath; disk grooved; drupe oblong or globose over .5 in. in diam.....1. *Jujuba*.

Low much-branched shrubs; drupe about 3 in. in diam.:—

Leaves fuscous-tomentose beneath, up to 1.5 in. in diam.; disk grooved; both straight and recurved thorns strong

Jujuba var. *fruticosa*.

Leaves grey-pubescent on both sides, .5-.75 in. in diam.; disk pitted; both straight and recurved thorns slender

2. *nummularia*

Unarmed tree; leaves elliptic, obtuse or slightly acute, glabrous or pubescent on nerves beneath and petiole; disk not pitted or grooved; fruit globose, yellow.....3. *trinervia*.

Very thorny large climber; leaves ovate-lanceolate, acute, 1-2.5 in. long, very oblique at base, silky-pubescent; drupe .25 in. in diam.; disk pitted.....4. *Oenoplia*.

Styles 3; flowers in pedunculate cymes; disk smooth:—

Small tree or straggling shrub, armed or unarmed; leaves usually suborbicular, reticulate and pubescent beneath; drupes globose, grey-tomentose or nearly glabrous, sometimes acute at apex.....5. *Xylopyrus*.

Low shrub with sharp thorns on broad bases; leaves small, glabrous except on nerves beneath; drupes globose, glabrous, the stones rugose.....6. *horrida*.

Petals 0; styles 2; erect small tree or climbing shrub; flowers in pedunculate cymes making panicles on terminal branchlets; leaves large, elliptic, cordate; thorns usually solitary, recurved; drupe 1- rarely 2-celled, stone crustaceous not rugose; disk smooth

7. *rugosa*.

1. ZIZYPHUS JUJUBA, Lamk.; F. B. I. i. 632; W. & A. 162; Wt. Ic. t. 99; Brand. For. Fl. t. 17.

In all dry Districts, wild in deciduous dry forests and

cultivated in and near villages and thence run wild on waste lands.

A low much-branched thorny tree with erect often thick stem and rounded head, the leaves suborbicular, fulvous-tawny beneath. Bark dark grey, nearly black, with irregular cracks. Wood hard, reddish, tough and strong, in regular use for saddle-trees and many other purposes and a good fuel. The fruit is edible. Vern. *Hind.* Bér; *Ur.* Borokoli; *Tel.* Rengha; *Tam.* Yellande, Ilantha; *Kan.* Yelchi; *Mal.* Cherumali.

Var. *fruticosa*, Haines, a shrub with small leaves, smooth very thorny branches and small fruit. Much used for fencing purposes.

Circars, Deccan and Carnatic, from Godavari to Tinnevely, chiefly on stony waste lands.

2. ZIZYPHUS NUMMULARIA, W. & A. 162; F. B. I. i. 633.

Deccan and Carnatic, in dry stony scrub forests, common on black cotton soil.

A small shrub with small leaves, divaricating very thorny zigzag branches and small fruit. The stems are cut for fencing purposes.

3. ZIZYPHUS TRINERVIA, Roxb. *Z. glabrata*, Wt. Ic. t. 282; W. & A. 162; F. B. I. i. 633.

W. Gháts on the E. side, in Coimbatore, Nilgiris and Anamalais to S. Travancore at low elevations, in dry localities.

A small unarmed tree up to 30 ft. high with a hard olive-brown wood. Vern. *Tam.* Kottei, Karukava; *Mal.* Karkala.

4. ZIZYPHUS OENOPLIA, Mill.; F. B. I. i. 634; W. & A. 163.

Almost all Districts, especially in dry forest localities and open bushy places.

A large, very thorny, straggling or climbing shrub. The branches are used in fencing, and the small black fruits are pleasant to eat. Vern. *Hind.* Makoh; *Ur.* Barokoli; *Tel.* Paranu, Pariki; *Tam.* Kottei; *Mal.* Múlli.

5. ZIZYPHUS XYLOPYRUS, Willd.; F. B. I. i. 634; W. & A. 162.

Almost all Districts in dry deciduous forests.

A large straggling shrub or small tree with globose,

velvety, sometimes nearly glabrous, fruit and 3-celled hard nut. The leaves are very white woolly when young but nearly glabrous when old. Wood reddish-brown, hard, similar to but not quite so good as that of *Z. Jujuba*. Vern. *Hind.* Kathér; *Ur.* Goto; *Tel.* Got; *Tam.* Kottei; *Mal.* Kotta.

Var. *acuta*, Gamble. *Leaves* ovate-acuminate, 3-3.5 by 1.5-2 in., very unequal at base. *Berry* ovoid, acute at apex, .75 in. long, velvety.

Upper Godavari Forests (Gamble).

6. *ZIZYPHUS HORRIDA*, Roth; F. B. I. i. 636; W. & A. 163.

Deccan, in Kurnool and Mysore in dry forests and scrub lands.

A shrub with very thorny branches, occasionally a small tree, the thorns with very broad bases. Leaves sub-orbicular, ovate or elliptic, serrate, nearly glabrous.

7. *ZIZYPHUS RUGOSA*. Lamk.; F. B. I. i. 636; W. & A. 162; Wt. Ic. t. 339.

All Forest Districts and up to 6,000 ft. in the W. Gháts, chiefly in dry deciduous forest localities.

A large straggling thorny shrub or small tree with large elliptic usually cordate leaves, paniculate flowers and small fruit. Wood reddish, moderately hard. Vern. *Hind.* Suran; *Ur.* Chunu koli; *Tam.* Charai; *Mal.* Thodali.

3. *Rhamnus*, Linn.

Small trees or shrubs. *Leaves* alternate, rarely subopposite, penninerved; stipules small, deciduous. *Flowers* hermaphrodite or polygamous, in axillary fascicles or in simple or compound racemes. *Calyx*-tube urceolate, lobes 4-5, keeled within. *Petals* 4-5 or 0, flat or cucullate. *Disk* lining the calyx-tube, the margin thin. *Stamens* as many as and opposite to the petals; filaments short; anthers oblong, in ♀ flowers very small. *Ovary* free, globose or ovoid, 3-4-celled; styles distinct or somewhat connate; stigmas small, papillose. *Fruit* a fleshy berry-like drupe, seated on the persistent calyx-tube; pyrenes 2-4, crustaceous. *Seed* obovoid; testa membranous or crustaceous; albumen fleshy; cotyledons flat, recurved at the margins; radicle short.

Branchlets ending in spines; flowers usually 4-merous, long-pedicel-

late, fascicled in the axils of the also usually fascicled membranous leaves; drupe 1-2-celled1. *virgatus*.
Branchlets without spines; flowers 5-merous, short-pedicelled, in cymes or racemes; leaves not fascicled; drupe 3-celled:—

Leaves subcoriaceous, ovate-oblong, closely serrate, usually acute at base, nerves prominent, about 8 pairs.....2. *Wightii*.

Leaves chartaceous, elliptic-oblong, distantly crenate-serrate, usually rounded at base, nerves hardly prominent, about 6 pairs
3. *nepalensis*.

1. RHAMNUS VIRGATUS, Roxb. *R. dahuricus* var. *hirsutus*, Lawson; F. B. I. i. 639. *R. hirsutus*, W. & A. 165.

W. Gháts, in the Nilgiris, Pulneys and the Hills of Tinnevely at 5,000-7,000 ft.

A shrub or small tree of forest undergrowth with leaves usually small but sometimes reaching 3 in. in length.

2. RHAMNUS WIGHTII, W. & A. 164; Wt. Ic. t. 159; F. B. I. i. 639.

W. Gháts in the Nilgiri and Pulney Hills, up to 7,000 ft.

A large shrub.

3. RHAMNUS NEPALENSIS, Lawson; F. B. I. i. 640.

E. Gháts, Mahendragiri Hill in Ganjam, 4,500 ft. (Gamble), Madgol Hills of Vizagapatam at 3,000 ft. (A. W. Lushington).

A large shrub.

4. *Scutia*, Commers.

Glabrous shrubs, usually armed with sharp-hooked thorns which are abortive branchlets, from the leaf-axils. *Leaves* opposite or subopposite, coriaceous, penninerved. *Flowers* hermaphrodite, small, in axillary fascicles or short-peduncled umbels. *Calyx*-tube turbinate; lobes 5, ovate, acute, thickened at the apex. *Petals* 5, clawed, emarginate, flat or cucullate. *Disk* adnate to the calyx-tube, cupshaped, the margin free, undulate. *Stamens* 5, as long as the petals. *Ovary* ovoid or globose, sunk in the disk, 2-4-celled; style short; stigmas 2-4, papillose. *Fruit* obovoid or subglobose, dry or slightly fleshy, girt at the base by the persistent calyx-tube; pyrenes 2-4, crustaceous, compressed; seeds compressed; testa membranous; albumen thin or 0; cotyledons plano-convex, fleshy.

SCUTIA MYRTINA, Kurz. *S. indica*, Brongn.; F. B. I. i. 640; W. & A. 165; Wt. Ill. i. t. 73. *S. Rheediana*, Wt. Ic. t. 1071.

N. Circars, Deccan and Carnatic, in dry deciduous and scrub forest; W. Gháts, on eastern slopes and up to 6,000 ft.

A straggling thorny shrub with small orbicular or obovate coriaceous shining leaves. The branches are cut for making dry hedges. Vern. *Tel.* Gariki; *Tam.* Tuvadi.

5. *Sageretia*, Brongn.

Straggling or climbing shrubs, usually armed with thorns which are frequently recurved, branches opposite or subopposite. *Leaves* subopposite, penninerved; stipules minute, deciduous. *Flowers* hermaphrodite, very small, sessile in fascicles along terminal leafy or leafless thyrseoid branches. *Calyx*-tube hemispheric; lobes 5, acute, keeled within. *Petals* 5, clawed, cucullate. *Stamens* 5, about equalling the petals. *Disk* cupshaped, filling the calyx-tube, margin free, 5-lobed. *Ovary* free, enclosed by the disk, 3-celled; style short, 3-grooved; stigmas 3, capitate. *Fruit* globose, 3-celled and -seeded, indehiscent; pyrenes 3, flattened. *Seeds* orbicular; testa crustaceous; albumen thin; cotyledons flat, leafy, obcordate.

Thorns few, straight, short; leaves ovate-lanceolate, gradually shortly acuminate, 2-4 in. long, 1-1.5 in. broad, main nerves about 6 pairs; thyrse-branches slender1. *parviflora*.

Thorns frequent, recurved, long; leaves elliptic-oblong, abruptly acuminate, 3-6 in. long, 1.5-2.5 in. broad, main nerves 8-10 pairs; thyrse-branches rather stout2. *hamosa*.

1. SAGERETIA PARVIFLORA, G. Don. *S. oppositifolia*, Brongn.; F. B. I. i. 641 in part. *Berchemia parviflora*, W. & A. 163.

N. Circars, Mahendragiri Hill in Ganjam, 4,500 ft., Reka-palle in Godavari; Deccan, on Hills, as on Horsleykonda, 4,500 ft., in Cuddapah, also in Mysore and Coimbatore; W. Gháts, N. and E. slopes of Nilgiris up to 6,000 ft.

2. SAGERETIA HAMOSA, Brongn.; F. B. I. i. 641.

W. Gháts, in the Nilgiri and Pulney Hills at 6,000-7,000 ft.

6. *Colubrina*, L. C. Rich.

Erect or sarmentose shrubs, unarmed. *Leaves* alternate, petio- late; stipules small, deciduous. *Flowers* in very short axillary

cymes. *Calyx*-tube hemispheric, lobes 5, keeled within. *Petals* 5, inserted below the disk, clawed, cucullate. *Disk* fleshy, 5-angled, filling the calyx-tube. *Stamens* 5, enclosed within the petals; filaments filiform. *Ovary* subglobose, sunk in the disk, 3-celled; style 3-cleft; stigmas obtuse, papillose. *Fruit* a 3-celled subglobose drupe, surrounded below the middle by the remains of the calyx-tube, later on capsular, loculicidally dehiscing, cells 1-seeded. *Seeds* obovoid compressed; testa coriaceous; albumen thin; cotyledons suborbicular, cordate, flattened.

Glabrous shrub; leaves ovate, obtusely acuminate at apex, rounded or cordate at base, 1·5-3 in. long, 1-2 in. broad; cymes slender

1. *asiatica*.

Large shrub with young branches, young leaves and inflorescence golden-pubescent; leaves oblong-lanceolate, acuminate at apex, rounded at base, 3-6 in. long, 1·5-2·5 in. broad; cymes rather stout

2. *travancorica*.

1. COLUBRINA ASIATICA, Brongn.; F. B. 1. i. 642; W. & A. 166; Wt. Ill. i. t. 74.

Coimbatore District (Beddome), often planted, especially near the coast.

2. COLUBRINA TRAVANCORICA, Bedd. Ic. t. 188; F. B. I. i. 643. E. Coast, in Travancore (Wight, Bedd., Bourdillon).

7. *Gouania*, Linn.

Unarmed shrubs, climbing by means of tendrils on the branchlets and at the base of the inflorescence. *Leaves* alternate, penninerved, petiolate; stipules lanceolate, deciduous. *Flowers* small, polygamous, in fascicles in interrupted axillary or terminal spikes or racemes. *Calyx*-tube short, obconic; lobes 5. *Petals* 5, inserted below the margin of the disk, cucullate. *Disk* flat or concave, filling the calyx-tube, with 5 rounded or horn-like lobes alternate with the stamens. *Stamens* 5, enclosed within the petals. *Ovary* sunk in the disk, 3-celled; style 3-cleft; stigmas minute, papillose; ovules solitary. *Fruit* coriaceous, inferior, tipped by the persistent calyx-lobes, of 3 separable indehiscent dry mericarps, attached to a central filiform receptacle, and produced on each side in rounded wings. *Seeds* plano-convex, obovate; testa hard, shining; albumen fleshy; cotyledons ovate, cordate at base, retuse at apex; radicle small.

Disk villous, the lobes rounded; leaves elliptic-ovate, gradually acuminate, rounded at base; entire or slightly crenate-serrate; inflorescence densely whitish-pubescent; mericarps small, '4 in. broad, '3 in. high 1. *microcarpa*.

Disk glabrous, the lobes stellately horned; leaves ovate, abruptly acuminate, subcordate at base, crenate-serrate; inflorescence merely puberulous; mericarps larger, '5-'6 in. broad, '4-'5 in. high

2. *leptostachya*.

1. *GOUANIA MICROCARPA*, DC.; F. B. I. i. 643; W. & A. 167.
W. Gháts, in all Districts from S. Canara and Mysore southwards, up to about 3,000 ft.

A large climbing shrub. Wt. Ic. t. 974 does not agree with either this or the next.

2. *GOUANIA LEPTOSTACHYA*, DC.; F. B. I. i. 643; W. & A. 166. *G. tiliaefolia*, Roxb. Cor. Pl. i. t. 98.

Forests of the N. Circars (see Roxb. W. & A., etc.).

A large climbing shrub. Vern. *Tel.* Penki tiga.

8. *Helinus*, E. Meyer.

Unarmed shrubs, climbing by means of tendrils; branches slender, angular. *Leaves* alternate, petiolate, entire; stipules small, deciduous. *Flowers* small, umbellate, on long slender axillary peduncles. *Calyx*-tube broadly obconic; lobes 5, superior. *Petals* 5, inserted on the margin of the disk, cucullate. *Disk* epigynous, filling the calyx-tube, 5-angled. *Stamens* 5, as long as the petals. *Ovary* inferior, 3-celled; style short, 3-cleft; stigmas small, recurved; ovules solitary. *Fruit* obovoid-globose, 3-celled, tardily separating into 3 crustaceous cocci attached to a central axis, the cocci dehiscent interiorly. *Seeds* plano-convex, shining; testa leathery, shining; albumen fleshy; cotyledons large, flat, obtuse; radicle very short.

HELINUS LANCEOLATUS, Brand.; F. B. I. i. 644.

E. Gháts, hilly country of Ganjam (Barber), Godavari (Beddome).

A slender climber with ovate-lanceolate entire leaves, 1-2.5 in. long, and flowers in long-stalked umbels.

Noltia africana, Harv. & Sond. is a Cape shrub which has been introduced into and has more or less run wild in the Nilgiris.

Species of *Pomaderris* and *Ceanothus* are grown in hill gardens as ornamental shrubs.

Family XLVII. VITACEAE.

Small trees or erect or climbing shrubs, the latter usually tendril-bearing, stems and branches nodose. *Leaves* alternate, simple lobed digitate or pedate, sometimes pinnate or bipinnate; petiole usually thickened at the articulate base; stipules 2. *Flowers* regular, hermaphrodite or unisexual, in paniced umbelled or spicate cymes usually opposite the leaves, peduncles often transformed into tendrils or tendril-bearing. *Calyx* small, entire or 4-5-toothed or -lobed. *Petals* 4-5, valvate, free or connate, caducous. *Disk* free or connate with the petals stamens or ovary, annular or expanded. *Stamens* 4-5, opposite the petals, inserted at the base of the disk or between its lobes; filaments subulate; anthers free or connate, 2-celled, introrse. *Ovary* usually sunk in the disk, 2-6-celled; ovules 1-2 in each cell, ascending, anatropous; style short; stigma small, capitate or slightly lobed. *Fruit* an indehiscent 1-6-seeded berry, often watery. *Seeds* erect, often rugulose; albumen cartilaginous sometimes ruminant; embryo basal; cotyledons ovate or cordate; radicle short, inferior.

Scandent, rarely erect, usually tendril-bearing, shrubs or herbs; stamens free; ovary 2 celled, cells 2-ovuled:—

Flowers polygamo-dioecious:—

Petals 5, deciduous in a calyptra; stigma obtuse; flowers in leaf-opposed thyrses often bearing tendrils on the peduncles; leaves simple, lobed; seeds pyriform, 2-furrowed on the face, 1-furrowed on the back with a prominent chalaza1. **Vitis**.

Petals 4, spreading or recurved in flower; stigma 4-lobed; flowers in corymbiform cymes without tendrils on the peduncles; leaves pedately 5- or sometimes 1-3-foliolate; seeds globose, oblong or pyriform, 2-furrowed on face, chalaza on back prominent

2. **Tetrastigma**.

Flowers polygamo-monoecious; petals 4-5, spreading or recurved in flower; stigma small or discoid; flowers in leaf-opposed cymes or thyrses with tendrils on the peduncle; leaves simple or lobed, sometimes digitate or pedate; seeds oblong or obovoid, convex on back, 2-furrowed on face3. **Ampelocissus**.

Flowers hermaphrodite; tendrils leaf-opposed :—

Petals 5, spreading or sometimes calyptrate; flowers in terminal or leaf-opposed dichotomous cymes ending in umbellules; leaves trifoliolate; seeds globose, smooth4. **Parthenocissus.**

Petals 4, at first connivent, then separating :—

Berry usually 1-seeded, the seeds ellipsoid or pyriform, smooth or faceted or pitted, the albumen with 3 vertical lobes; leaves usually simple, sometimes 3-foliolate or digitate5. **Cissus.**

Berry 2-4-seeded; seeds hemispheric with deep pits, oblong angular or pyriform; albumen only sometimes with 3 vertical lobes; leaves 3-foliolate or pedate or digitate6. **Cayratia.**

Erect shrubs without tendrils; stamens free or connate at their margins, the filaments inserted in the lobes of a staminal tube; ovary 3-6-celled, cells 1-ovuled; leaves large, simple or 1-3-pinnate.

7. **Leea.**

1. *Vitis*, L. (reduced).

Shrubs, usually climbing, with tendrils opposite to the leaves or on the peduncles. *Leaves* simple, variously lobed; stipules 2, deciduous. *Flowers* polygamo-dioecious, in leaf-opposed thyrses. *Calyx* cupular, with 5 obscure teeth. *Petals* 5, coherent by their tips and deciduous as a calyptra. *Stamens* 5; filaments slender, long in ♂ shorter in ♀; anthers introrse. *Disk* of 5 hypogynous glands, sometimes confluent. *Ovary* 2-celled, 2 ovules in each cell; styles very short or 0; stigma obtuse. *Fruit* a 2-celled succulent berry. *Seeds* 4 or less, pyriform, 2-furrowed on the face, 1-furrowed on the back with a prominent rounded or elliptic chalaza.

VITIS LANATA, Roxb.; F. B. I. i. 651 *in part*; W. & A. 131 *in part*.

E. Gháts, in the Hills of Vizagapatam and Godavari at 2,000-3,500 ft.

A climbing shrub with porous wood, dark brown bark, ovate-cordate slightly 3-lobed leaves and small globose fruit, the young shoots and under surface of the leaves covered with cinnamomeous wool.

Vitis vinifera, L. the Vine, is not much cultivated in Madras, but good fruit has been grown in the Deccan Hills as in Mysore and Kurnool.

2. *Tetrastigma*, Planch.

Climbing shrubs with simple or forked tendrils, the stems and branches often flattened. *Leaves* usually pedate with 5-7 leaflets, sometimes 1- or 3-foliolate. *Flowers* polygamo-dioecious, in axillary rarely leaf-opposed cymes, the cymes corymbose, 2-3-chotomous, puberulous. *Calyx* cupular, scarcely lobed, very small. *Petals* 4, spreading or recurved in flower, the tip usually mucronate-hooded. *Stamens* 4, in ♀ flowers very much reduced and staminodial. *Disk* hypogynous, more or less persistent in fruit. *Ovary* 2-celled with 2 ovules in each cell; style short; stigma 4-lobed. *Fruit* a 1-4-seeded berry, usually succulent, sometimes nearly dry. *Seeds* globose, oblong or pyriform, convex on the back with a prominent chalaza, 2- or forked-furrowed on the face, often crenately channelled on the sides, albumen ruminant.

Berry small, about .25 in. in diam., seed smooth, globose; stems not or little tuberculate:—

Leaves usually pedately 5-foliolate, leaflets lanceolate or oblanceolate, sharply acuminate, distantly but prominently serrate, more or less fleshy, not prominently reticulate.....1. *lanceolarium*.

Leaves 3-foliolate, leaflets elliptic, obtusely acuminate, entire or nearly so, submembranous, prominently reticulate.....2. *canarense*.

Berry rather large, over .5 in. in diam.; seed oblong or pyriform, crenate on margin; stems tuberculate:—

Seed oblong, with a clavate chalaza on back and 2 deep furrows on face, crenatures slight; leaves large, pedately 5-foliolate, acuminate, crenate on margins3. *sulcatum*.

Seed pyriform, chalaza on back oblong, furrows on face shallow, marginal crenatures deep; leaves small, 3-foliolate or sometimes pedately 5-foliolate, uppermost often 3-foliolate, acute, glabrous, margins shortly serrate4. *muricatum*.

1. *TETRASTIGMA LANCEOLARIUM*, Planch. *Vitis lanceolaria* Roxb.; F. B. I. i. 660; W. & A. 128; Wt. Ic. t. 177. *V. serratifolia*, W. & A. 128.

N. Circars and Deccan to the E. slopes of the Nilgiris up to 5,000 ft.

A large climber with flattened stems and dry fruit.

2. *TETRASTIGMA CANARENSE*, Gamble n. comb. *Vitis canarensis*, Dalz.; F. B. I. i. 655.

W. Gháts, in Wynaad at 3,000 ft. (Lawson).

A climber with trifoliolate leaves and red (or dead white *Dalzell*) berry, liked by monkeys.

3. *TETRASTIGMA SULCATUM*, Gamble, n. comb. *Vitis sulcata*, Laws. ; F. B. I. i. 661.

W. Gháts, from Malabar and W. Nilgiris to the Anamalais and Travancore Hills up to 4,500 ft.

A large climber with thick stems and large green berry.

4. *TETRASTIGMA MURICATUM*, Gamble n. comb. *Vitis muricata*, Wall. ; W. & A. 660 ; Wt. Ic. t. 740. *V. lanceolaria*, Laws. in F. B. I. i. 660 *in part* ; Wt. Ic. t. 28 *not of* Roxb. W. Gháts, in most Districts and up to 6,000 ft., fairly common.

A large climber with prominently warted branchlets.

3. *Ampelocissus*, Planch.

Climbing shrubs, with tendrils on the peduncles. *Leaves* simple, entire or lobed, sometimes digitate or pedate or biternate. *Flowers* polygamo-monoecious, ♂ pseudo-hermaphrodite, in leaf-opposed pedunculate cymes or thyrses, the peduncles tendrill-bearing. *Calyx* cupular, with 4-5 obscure teeth. *Petals* 4-5, spreading or recurved in flower. *Stamens* 4-5, inserted without the disk ; filaments slender. *Disk* annular, erect, often vertically 5-10-furrowed. *Ovary* 2-celled, immersed more or less in the disk ; 2 ovules in each cell ; style short, conical, often 10-furrowed ; stigma small in ♂, discoid in ♀. *Fruit* a 2-3-seeded succulent berry. *Seeds* oblong or obovoid, convex on the back, 2-furrowed, with a broad keel (raphe) on the face, often crenately cleft on the margins.

Disk short, thin, embracing merely the base of the ovary, not furrowed :—

Cyme thick-branched, woolly :—

Leaves orbicular-cordate or 3-7-angled or -lobed, cinnamomeous-tomentose beneath, seeds obcordate, crenate on the margins, 2-furrowed and keeled on the face, pitted on the back and with prominent ray-like clefts 1. *tomentosa*.

Leaves 3-foliolate, the side leaflets semi-cordate, the middle one ovate, greyish brown-tomentose beneath ; seeds obovate but not crenate on the margins, broadly ridged on the face, pitted and with shallow rays on the back 2. *araneosa*.

Cyme nearly or quite glabrous ; leaves thin, 3- rarely 5-foliolate

the side leaflets semicordate, the end one lanceolate, thinly grey-pubescent beneath3. *divaricata*.

Disk short, thick, 5-furrowed; leaves orbicular or cordate, rounded or 3-5-angled or -lobed, glabrous; inflorescence a small compact puberulous thyrse; seed oblong, crenate on the margin4. *latifolia*.

Disk elongate, thickened, embracing most of the ovary, 5-furrowed; leaves orbicular cordate, the margins denticulate-serrate with hard points :--

Flowers in often very large very thick compound cymes, sessile or subsessile in the middle of copious wool; calyx also with long hairs5. *eriolada*.

Flowers in sessile umbels with slender pedicels in short racemes, woolly at base at first, later on nearly free from it; calyx without long hairs6. *Arnottiana*.

1. AMPELOCISSUS TOMENTOSA, Planch. *Vitis tomentosa*, Heyne; F. B. I. i. 650; W. & A. 130; Wt. Ill. t. 57.

N. Circars, Deccan and Carnatic, in hill forests; W. Gháts, from Coorg to the Anamalais up to 5,000 ft.

A large climbing vine with scarlet flowers; young shoots and leaves and stems with much cinnamomeous wool, the leaves variable in shape and lobes.

2. AMPELOCISSUS ARANEOSA, Planch. *Vitis araneosus*, Lawson; F. B. I. i. 657.

W. Gháts, in the Nilgiri, Pulney and Anamalai Hills, Shevaroy Hills of Salem, up to 4,500 ft.

A slender far-climbing shrub, the leaves sometimes merely lobed.

3. AMPELOCISSUS DIVARICATA, Planch. *Vitis divaricata*, Wall.; F. B. I. i. 657.

E. Gháts in the Madgol Hills of Vizagapatam at 3,500 ft. (A. W. Lushington).

A slender climber with thin long-acuminate usually 3-foliolate leaves.

4. AMPELOCISSUS LATIFOLIA, Planch. *Vitis latifolia*, Roxb.; F. B. I. i. 652; W. & A. 130.

N. Circars, Deccan and Carnatic in hill forest regions, westwards to the Nilgiri and Anamalai slopes.

A rather slender herbaceous climbing vine with thin broad variable glabrous leaves, only the young shoots and inflorescence pubescent.

5. AMPELOCISSUS ERIOCLADA, Planch. *Vitis erioclada*, W. & A. 130; F. B. I. i. 651.

W. Gháts, Hills of Tinnevely (Wight, etc.).

A stout climber with hollow cylindric stem and large thick-branched panicles of cymes.

6. AMPELOCISSUS ARNOTTIANA, Planch. *Vitis indica*, W. & A. 131; F. B. I. i. 653 *not of* Linn.

W. Coast and W. Gháts from S. Canara to Tinnevely, up to 3,000 ft. in Wynaad.

A slender climbing shrub, the branches and leaves covered with much ferruginous wool; the flowers in short dense racemes of umbels, the seed convex and rugose on the back, hollowed in 2 cavities in front with a sharp ridge between.

4. Parthenocissus, Planch.

Climbing shrubs with much-branched tendrils, opposite the leaves, the tendril-branches ending in disks which attach themselves to objects; stems often short thick-barked. *Leaves* trifoliolate, long-petiolate, side leaflets semicordate at base on the outer, narrowly contracted on the inner side. *Flowers* hermaphrodite, in terminal or leaf-opposed branched dichotomous cymes, ending in umbellules. *Calyx* cupular, irregularly 5-dentate. *Petals* 5, induplicate-valvate, spreading or sometimes calyptrate, each petal hooded at the tip and with a usually bifid acumen. *Stamens* 5, inserted under the disk; anthers oblong. *Disk* thin and obscure, adnate to the base of the ovary. *Ovary* ovoid, 2-celled; style short, thick; stigma small, capitate; ovules 2 in each cell. *Fruit* a rarely 2-4-seeded berry. *Seeds* globose, smooth, with a narrow raphe half-encircling.

PARTHENOCISSUS NEILGHERRIENSIS, Planch. *Vitis neilgherriensis*, Wt. Ic. t. 965. *Vitis himalayana*, Brandis; F. B. I. i. 655 *in part*. *V. anamalayana*, Bedd.; F. B. I. i. 656.

W. Gháts, from the Nilgiris to the Anamalai and Pulney Hills, up to 6,000 ft.

A vast climber (Lawson) with large leaves, the leaflets often 6 in. long, cuspidate-serrate and usually very long-acuminate at the tips.

5. *Cissus*, Linn. (modified).

Shrubs, erect or climbing, with tendrils opposite to the leaves, occasionally absent in erect species. *Leaves* simple or lobed, rarely trifoliolate. *Flowers* hermaphrodite, tetramerous, in umbellately divided cymes opposite to the leaves, the branches ending in umbellules. *Calyx* cupshaped, entire or obscurely lobed. *Petals* 4, triangular-ovate, induplicate-valvate, at first connivent in a calyptrate corolla, afterwards separating. *Stamens* 4; filaments slender; anthers usually oblong. *Disk* small, 4-lobed, adnate to the base of the ovary. *Ovary* 2-celled, with 2 ovules in each cell; style subulate; stigma small. *Fruit* usually 1-seeded, occasionally with 2 or more, a fleshy berry. *Seeds* ellipsoid or pyriform, with an encircling raphe, smooth or faceted or pitted on either side, the testa crustaceous with two interior ridges at the base; albumen with 3 vertical lobes; cotyledons reniform, sometimes 3; radicle rather large.

Seeds smooth except for encircling raphe :—

Seeds ellipsoid, pale; berry globose, red; stems 4-winged, fleshy, contracted at the nodes; leaves broadly reniform, entire or lobed

1. *quadrangularis*.

Seeds more or less pyriform; stems not winged :—

Leaves usually trifoliolate, rarely only lobed or entire, leaflets lanceolate, the side ones very unequal-sided; berry black; slender climbers.....2. *trilobata*.

Leaves ovate acuminate, deeply cordate at base, green when dry, membranous; berry black; slender trailers with glaucous-white stems3. *repens*.

Leaves more or less orbicular, cordate at base :—

Erect glabrous shrubs with grey bark and glaucous branchlets, rarely with tendrils; leaves large, cordate, with shallow incurved serratures; fruiting pedicels thick; berry top globose; seeds smooth.....4. *pallida*.

Climbing shrubs with tendrils :—

Glabrous, the stems pale, smooth, leathery, branchlets glaucous; leaves thick and leathery, poplar-like, cordate, obscurely crenate-serrate, pale when dry; fruiting pedicels clavate; berry-top globose, seeds smooth on the face

5. *Heyneana*.

Tomentose, the stems soft, wrinkled, branchlets terete, soft, subglaucous; leaves shallowly cordate, repand-crenate, dark

when dry; fruiting pedicels slender; berry-top oblong, seeds with a faint crescent ridge on the face6. *repanda*.

Seeds tessellated on either side of the raphe with angular facets:—

Very tomentose; pedicels usually recurved in fruit:—

Tomentum grey; leaves broadly cordate, 5-angled or sometimes 7-lobed, conspicuously blunt-serrate; berry blue, glaucous

7. *vitiginea*.

Tomentum ferruginous; leaves broadly cordate, acuminate, with inconspicuous bristly serratures; berry black8. *adnata*.

Glabrous, the branchlets glaucous; pedicels erect in fruit; leaves cordate, rounded above with an abrupt acumen, bristly serrate, nearly black when dry.....9. *glauca*.

Seeds with pits in lines on either side of the raphe:—

Slender climbing plants, glabrous or nearly so; berries glabrous:—

Seeds obovoid; branchlets subangular, red, herbaceous; leaves ovate, cordate, acuminate, blotched with pink and white on the upper surface, purple on the lower; berry reddish-purple

10. *discolor*.

Seeds obtriangular; branchlets 4-winged, soft; leaves ovate, truncate-cordate at base, green; berry black-purple

11. *glyptocarpa*.

Fleshy herbaceous plants, very bristly setose, especially the berries; leaves trifoliate, the leaflets sharply serrate; berry bright red, the seeds deeply pitted and crenate on the margins12. *setosa*.

1. *CISSUS QUADRANGULARIS*, Linn. *Vitis quadrangularis*, Wall.; F. B. I. i. 645; W. & A. 125; Wt. Ic. t. 51.

N. Circars, Deccan and Carnatic, in dry regions, extending west to the lower E. slopes of W. Gháts and south to S. Travancore.

A much rambling shrub, the branches climbing over bushes to a long distance. Vern. Tel. Nalleru; Mal. Changalaparanda.

2. *CISSUS TRILOBATA*, Lamk. *Vitis Rheedii*, W. & A. 127; F. B. I. i. 653.

W. Coast and W. slopes of W. Gháts in Malabar and Travancore up to 3,000 ft.

A weak fleshy-stemmed climbing shrub with white berries.

3. *CISSUS REPENS*, Lamk. *Vitis repens*, W. and A. 125; F. B. I. i. 646.

W. Coast and W. Gháts from S. Canara to the Anamalais and Travancore, up to 4,000 ft.

A weak trailing shrub, the stems glaucous and glabrous, with ovate-cordate thin leaves.

4. *CISSUS PALLIDA*, Planch. *Vitis pallida*, W. & A. 125; F. B. I. i. 647.

N. Circars, Deccan and W. Gháts in dry forests, especially in the Ceded Districts.

An erect shrub with large leaves and woody stem, occasionally tendril-bearing and perhaps somewhat scandent.

5. *CISSUS HEYNEANA*, Planch. *Vitis Heyneana*, Wall.; F. B. I. i. 647; W. & A. 125.

W. Gháts, from the Nilgiris to the Pulneys and the Hills of Travancore, at low levels, scarce.

A coarse climber with thick fleshy stems and ovate-cordate pale green poplar-like leaves scarcely serrate.

6. *CISSUS REPANDA*, Vahl. *Vitis repanda*; W. & A. 125; F. B. I. i. 648.

Deccan, in the Hills of Cuddapah, Anantapur and Mysore up to 4,500 ft., Hills of Chingleput; E. slopes of W. Gháts from Nilgiris to Tinnevely.

A climbing shrub with branched and twisted tendrils and pyriform fruit.

7. *CISSUS VITIGINEA*, L. *Vitis Linnaei*, Wall.; F. B. I. i. 649; W. & A. 126.

N. Circars, in Vizagapatam and Godavari; Deccan and Carnatic, in hill scrub forests chiefly, up to 4,500 ft. and west to the lower slopes of the Pulney Hills; W. Coast, in Travancore, in secondary forests.

A small, erect trailing or climbing, grey-tomentose shrub, with blue single-seeded berries.

8. *CISSUS ADNATA*, Roxb.; Wt. Ic. t. 144. *Vitis adnata*, Wall. F. B. I. i. 649; W. & A. 126.

W. Coast and W. slopes of Gháts, at low levels.

A slender far-climbing shrub with ferruginous tomentum on leaves.

9. *CISSUS GLAUCA*, Roxb. *Vitis glauca*, W. & A. 126; F. B. I. i. 648.

W. Coast and W. Gháts up to 4,000 ft.

A stout rambling shrub with glaucous stems and cordate cuspidate leaves.

10. *CISSUS DISCOLOR*, Blume. *Vitis discolor*, Dalz.; F. B. I. i. 647. *V. inaequalis*, W. & A. 125.

W. Coast and W. Gháts, in evergreen forest, up to 4,000 ft.

A slender climber with red branches and pedicels and very pretty blotched leaves, often cultivated.

11. *CISSUS GLYPTOCARPA*, Planch. *Vitis glyptocarpa*, Thw.; F. B. I. i. 646.

W. Gháts, W. slopes of Nilgiris at 1,000 ft. (Lawson), Tinnevely Hills (Barber).

A slender climbing shrub with winged branchlets and conspicuously pitted seeds.

12. *CISSUS SETOSA*, Roxb. *Vitis setosa*, Wall.; F. B. I. i. 654; W. & A. 127; Wt. Ic. t. 170.

Deccan and Carnatic, in dry localities, extending westwards to the E. slopes of the W. Gháts.

A herbaceous Rambler with fleshy stems and leaves and a red hairy berry, the whole plant very acrid.

Cissus gigantea, Planch; *Vitis gigantea*, Bedd, is a little known species of very large size, near *C. repanda*, Vahl, with deeply cordate nearly glabrous leaves, in the Anamalai Hills at 2,000 ft.

6. Cayratia, Juss.

Climbing shrubs with tendrils opposite to the leaves. *Leaves* alternate, trifoliate or pedate; stipules 2, small. *Flowers* hermaphrodite, tetramerous, in axillary or pseudo-terminal corymbs or umbels. *Calyx* cupular, not or rarely toothed. *Petals* 4, valvate, sometimes corniculate, more or less cucullate within. *Stamens* 4, inserted round the disk; anthers introrse. *Disk* entire, sinuate or lobed, adnate with the ovary. *Ovary* 2-celled, with 2 ovules in each cell; style subulate; stigma indistinct. *Fruit* a 2-4-seeded berry, usually dry. *Seeds* obcordate, smooth or angular, hemispheric pyriform or oblong, convex on the back, with 1 or 2 ventral cavities covered with a membrane, the section of the albumen often making a crescent or a T; cotyledons small, ovate; radicle small.

Seed hemispheric, sect on of seed-albumen more or less crescent-shaped;—

Section of albumen with nearly circular outline, not grooved within, face-cavity deep; leaves trifoliolate, leaflets large, glabrous, entire or undulate-dentate; fruiting peduncles 2 in. long, fruit dry

1. *Roxburghii*

Section of albumen somewhat flattened, 2-grooved within, slightly angled on sides, face cavity round, small; leaves pedately 7-9-foliolate, usually softly pubescent, leaflets oblong-lanceolate, acuminate; fruiting peduncles 1-1.5 in. long, fruit rather dry, white

2. *pedata*.

Section of albumen rectangular with incurved ends, 2-grooved within, face cavity the whole length of seed; leaves 3-foliolate, long and softly villous as are the branchlets and fruit; fruit fleshy, white, nearly 1 in. in diam

3. *mollissima*.

Seed pyriform, small, section of seed-albumen T-shaped:—

Seed very acute at base, much rugose above, chalaza on back round; leaves pedately 5-foliolate, glabrous or pubescent, leaflets sharply serrate

4. *japonica*.

Seed trigonous, the plane faces pitted, chalaza on back linear with shallow bars on either side; leaves pedately 3-foliolate, usually pubescent, leaflets dentate, rounded or acute

5. *carnosa*.

Seed with sharp angles, the base rounded, the face keeled, section of seed-albumen subrectangular; fruit black; leaves pedately 5-foliolate, glabrous, leaflets small, sharply serrate; flower-peduncles and pedicels filiform

6. *tenuifolia*.

Seed obovate-oblong, furrowed and transversely ridged on the back, 2-pitted on the face, the section showing 3 vertical lobes in the albumen; fruit red; leaves digitate, the leaflets obovate, acuminate, serrate, the stipules falcate; flower-peduncles and pedicels fleshy

7. *auriculata*.

1. CAYRATIA ROXBURGHII, Gagnep. *Vitis Roxburghii*, W. & A. 127; F. B. I. i. 655.

Tinnevely Hills, at Courtallum (Wight).

A glabrous climbing shrub with smooth black shining bark.

2. CAYRATIA PEDATA, Juss. *Vitis pedata*, Vahl; F. B. I. i. 661; W. & A. 128.

N. Circars, in the Hills of Vizagapatam and Godavari; W. Gháts and W. Coast in all Districts.

A large but weak climbing shrub with soft pubescent leaves.

Var. *glabra*, Gamble.

Nilgiri Hills at 3,000 to 6,000 ft.

A small variety with thin glabrous long-acuminate leaflets.

3. CAYRATIA MOLLISSIMA, Gagnep. *Vitis mollissima*, Wall.; F. B. I. i. 656.

W. Gháts, in Malabar and Nilgiris, in evergreen forest, up to 3,000 ft. (Lawson).

4. CAYRATIA JAPONICA, Gagnep. *V. tenuifolia*, W. & A. 129, *in part*; F. B. I. i. 660, *in part*.

W. Gháts, in S.E. Wynaad, W. Nilgiri slopes, at 3,000 ft. (Lawson).

A very slender climber.

5. CAYRATIA CARNOSA, Gagnep. *Vitis carnos*a, Wall.; F. B. I. i. 654; W. & A. 127; Wt. Ic. t. 171.

N. Circars, in Vizagapatam and Godavari; Deccan and Carnatic, but less common and chiefly in hills; W. Coast and W. Gháts, common.

A somewhat fleshy twining shrub with usually pubescent but often nearly glabrous leaves and white berries with trigonous seeds.

6. CAYRATIA TENUIFOLIA, Gagnep. *Vitis tenuifolia*, W. & A. 129 *in part*; F. B. I. i. 660 *in part*. *Cissus tenuifolia*, Heyne; Planch. Monog. 563.

W. Gháts, in S.E. Wynaad, at 3,000 ft., Hills of Tinnevely (Barber).

A very slender graceful little vine with characteristic seeds.

7. CAYRATIA AURICULATA, Gamble n. comb. *Vitis auriculata*, Wall.; F. B. I. i. 658; W. & A. 129, *in part*; Wt. Ic. t. 145.

N. Circars, in Godavari (Barber); W. Gháts, in the Anamalai Hills, at 3,000 ft. (Gamble).

A large climber with spongy stems and red succulent berries, the seed-structure more like that of *Cissus*.

7. Leea, Linn.

Small trees, shrubs or herbs; branches striate or furrowed, the pith often very large; no tendrils. *Leaves* alternate, usually large, simple or 1-2-3-pinnate; petiole dilated at the base into sheathing stipules. *Flowers* small, red yellow white or greenish, in leaf-opposed or subterminal peduncled corymbose cymes. *Calyx* cupshaped or funnel-shaped, 5-lobed. *Petals* 5, connate at the base and adhering to the staminal tube, afterwards revolute,

induplicate-valvate, hooded at apex and connate in bud. *Disk* or staminal tube cylindric with 5 lobes, connate at the base with the ovary, furnished within with a dependant toothed membranous fold; lobes entire or more or less prominently notched, sometimes apiculate. *Stamens* 5, the filaments inserted between the lobes of the disk, inflexed; anthers attached by their middles within the tube, introrse, free or connate at their margins in bud, dehiscing longitudinally; connective thick, oblong. *Ovary* inserted on the base of the disk, 3-6-celled; style short; stigma scarcely thickened; ovule 1 in each cell. *Fruit* a 3-6-celled, usually succulent, depressed-globular, lobed, berry with 3-6 seeds attached to the centre. *Seeds* wedge-shaped with a hard external and membranous inner testa, the latter deeply protruded in about 6 folds into the albumen; embryo basal with small ovate cotyledons, radicle long.

Flowers red; anthers united in bud; lobes of staminal tube notched; leaves bipinnate, leaflets ovate-lanceolate, long acuminate, dark brown to nearly black when dry, main nerves curved upwards with 3-4 serratures each, transverse nervules irregularly subparallel

1. *Wightii*.

Flowers white or greenish white:—

Leaves simple or with few large pinnules; anthers united in bud; herbaceous undershrubs:—

Leaves simple, cordate, hoary puberulous beneath, very large, main nerves distant, slightly curved, branching near the margin into 3-4 small serratures; transverse nervules irregular; lobes of staminal tube entire or slightly cleft; fruit black

2. *macrophylla*.

Leaves with 3-5 large pinnules, the lower ones sessile or nearly so, hoary puberulous beneath, main nerves distant, branching towards the margin into 3-5 serratures; transverse nervules subparallel, branched; lobes of staminal tube notched...3. *latifolia*.

Leaves pinnate, sometimes bipinnate, main nerves close and parallel, as also the transverse nervules; anthers not united in bud; lobes of staminal tube notched; undershrubs:—

Stems, petioles and inflorescence branches with crisp wings; leaflets usually oblong, with one main nerve to each serrature and sometimes an intermediate small one, nearly glabrous; ripe fruits steel-grey4. *crispa*.

Stems, etc., without crisp wings; ripe fruits black:—

Leaflets ovate cordate, main nerves dividing at top, each branch running into a crenature; upper surface usually prominently asperous between the nerves5. *aspera*.

Leaflets ovate, long acuminate, more or less acute at base, main nerves of leaves not prominently dividing at top, the serratures having smaller ones between each pair; upper surface not or only slightly asperous, often punctate6. *herbacea*.

Leaves 2-3-pinnate, main nerves more or less distant; anthers united in bud, large shrubs:—

Lobes of staminal tube entire or nearly so:—

Lobes of staminal tube entire or slightly notched or serrate; leaflets large and broad, membranous, pubescent, especially on the nerves, ovate-oblong, rounded or subcordate at base, light brown when dry; main nerves curved, thin, rather distant, each space with several serratures, transverse nervules indistinct, irregular.....7. *robusta*.

Lobes of staminal tube apiculate; leaflets small, membranous, ovate or lanceolate, sharply serrate, with stiff hairs on the upper surface and reddish pubescence on the nerves beneath, nearly black when dry; transverse nervules indistinct, irregular.....8. *Venkobarowii*.

Lobes of staminal tube notched at the apex:—

Leaves glabrous, often very large and much divided, leaflets oblong or elliptic-oblong, chartaceous, dark brown when dry, main nerves distant, curved, forked at top, the smaller branch running into the crenature, usually a second crenature between each pair, transverse nervules many, not prominent; fruit black-purple9. *sambucina*

Leaves pubescent, often scurfy, especially on nerves, under surface with flat circular disks; leaflets long, oblong, acuminate, with 2-3 shallow serratures to each main nerve, transverse nervules prominent, parallel; fruit black ... 10. *aequata*.

1. LEEA WIGHTII, C. B. Clarke in Journ. Bot. 1881, 105.
L. Staphylea, Wt. Ill. t. 58 *not of* Roxb.

W. Gháts, in Wynaad, W: slopes of Nilgiris, Anamalais and Hills of Tinnevely.

An undershrub of evergreen forests.

2. LEEA MACROPHYLLA, Roxb.; F. B. I. i. 664, *in part*; Wt. Ic. t. 1154; C. B. Clarke l.c. 137.

W. Gháts, in Malabar and Nilgiris in forest undergrowth.

A herbaceous plant of Teak and similar dry forests.

3. *LEEA LATIFOLIA*, Wall.; C. B. Clarke l.c. 138. *L. cinerea*, Laws. in F. B. I. i. 665. *L. coriacea*, Laws. l.c.
W. Gháts, in Malabar (Wight, Barber).
4. *LEEA CRISPA*, Linn.; F. B. I. i. 665; C. B. Clarke l.c. 135.
W. Gháts, in Malabar and W. Nilgiri slopes.
A low undershrub, easily recognized by the crispations of the branchlets and petioles.
5. *LEEA ASPERA*, Edgew.; F. B. I. i. 665; C. B. Clarke l.c. 136.
N. Circars, in the Hills of Ganjam and Godavari; W. Gháts, in Wynaad and Anamalais up to 3,000 ft.
A large undershrub of Teak and other rather dry forests.
6. *LEEA HERBACEA*, Ham.; C. B. Clarke l.c. 137.
Deccan, Sandur Hills of Bellary at 3,000 ft.
A large undershrub, hardly distinct from *L. aspera*.
7. *LEEA ROBUSTA*, Roxb.; W. & A. 132. *L. diffusa*, Laws. in F. B. I. i. 667.
E. Gháts, Hills of N. Circars to the Godavari, up to 3,000 ft.; W. Gháts, in Malabar and W. Nilgiris up to 3,000 ft.
A large shrub with thick often hollow stems and thin leaves.
8. *LEEA VENKOBAROWII*, Gamble in Kew. Bull. 1917, 26.
W. Gháts, in the Anamalais at 3,000 ft. (Gamble), Hills of Travancore (Venkoba Row).
9. *LEEA SAMBUCINA*, Willd.; C. B. Clarke l.c. 139; F. B. I. i. 666 *in part*. *L. Staphylea*, Roxb.; W. & A. 132; Wt. Ic. t. 78.
E. Gháts, in the Hills of the N. Circars, up to 4,000 ft.; Deccan, Seshachellam Hills of Cuddapah at 3,000 ft.; W. Gháts, in all Districts in evergreen forests up to 4,000 ft.
Usually a large shrub, but occasionally growing into a small tree up to 30 ft. high. Vern. *Tam.* Nyekki, Otta náli; *Mal.* Nyeru, Maniporandi; *Mar.* Dino.
10. *LEEA AEQUATA*, Linn.; C. B. Clarke l.c. 163. *L. hirta*, Roxb.; F. B. I. i. 668.
N. Circars, in Ganjam forests (Gamble).
A large shrub with scurfy pubescent leaves, the glands on their undersurface, rather scarce.

Family XLVIII. STAPHYLEACEAE.

Trees or shrubs. *Leaves* opposite or alternate, usually trifoliolate or imparipinnate, stipulate. *Flowers* in terminal or axillary panicles, regular, hermaphrodite. *Calyx* of 5 free or nearly free imbricate sepals. *Petals* 5, imbricate. *Disk* annular, attached to the base of the calyx, usually lobed. *Stamens* 5, opposite the sepals; anthers 2-celled, the cells introrse. *Ovary* of 3 carpels, free or combined; styles short; stigmas capitate; ovules 2 or more in each cell. *Fruit* of 3 dehiscent capsules or follicles or an indehiscent berry. *Seeds* 4, arillate or exarillate, albuminous; embryo oblique; cotyledons flat.

Turpinia, Vent.

Trees or shrubs with terete branches. *Leaves* opposite, imparipinnate, the leaflets opposite, stipellate, serrate. *Flowers* small, regular, in terminal and axillary panicles with opposite branches. *Calyx* of 5 sepals. *Petals* 5, imbricate. *Disk* an erect ring, lobed or crenate. *Stamens* 5, inserted outside the disk. *Ovary* sessile, 3-lobed, 3-celled; ovules 2 collateral or several 2-seriately superposed. *Fruit* a subglobose, fleshy berry, 3-celled. *Seeds* angular without arillus; testa hard, shining, often mottled; hilum large; albumen fleshy; cotyledons flat or plano-convex.

Leaflets lanceolate, long-acuminate; flowers small, about .2 in. in diam.; drupe size of a pea, 1-3-lobed; filaments glabrous; disk deeply lobed.....1. *nepalensis*.

Leaflets elliptic; abruptly obtuse-acuminate; flowers about .4 in. in diam.; drupe size of a cherry, 1-3 pointed but not lobed; filaments shortly villous; disk evenly crenate2. *malabarica*.

1. TURPINIA NEPALENSIS, Wall.; W. & A. 156; Wt. Ic. t. 972; Bedd. Fl. t. 159. *T. pomifera*, DC.; F. B. I. i. 698 in part.

W. Gháts, common in Nilgiri Shola forests at high levels, usually about 5,000 ft.; Pulneys and Travancore Hills, less common.

A moderate-sized tree with a soft grey useless wood. Vern. *Budaga*, Nila.

2. TURPINIA MALABARICA, Gamble in Kew Bull. 1916, 135.

W. Coast; W. Gháts in the Anamalai Hills and Hills of Travancore at low levels.

A large tree with bright yellow young leaves. Vern. *Tam. Kanali*; *Mal. Pamba vetti*.

Family XLIX. ACERACEAE.

Trees or shrubs. *Leaves* opposite, petioled; stipules 0. *Flowers* regular, polygamous. *Sepals* and *petals* isomerous, sometimes wanting. *Disk* annular or lobed, sometimes small or 0. *Stamens* 4-10, more usually 8, inserted outside or upon, rarely inside, the disk; filaments free. *Ovary* of 2 carpels, each 1-2-ovuled. *Fruit* of 2 indehiscent samaroid mericarps; albumen 0.

Acer, Linn.

Trees or shrubs; buds with many scales, the outer short, coriaceous, the inner oblong, membranous, developing later. *Leaves* entire or palmately lobed or divided or pinnately 3-5-foliate. *Flowers* regular, in terminal or lateral racemes or corymbs. *Calyx* usually 5-, sometimes 4-12-lobed, the lobes imbricate, deciduous. *Petals* as many as the calyx-lobes, or 0, erect, shortly clawed. *Disk* thick, annular or cupshaped. *Stamens* usually 8, inserted on the disk; filaments usually shorter in ♂ than in ♀ flowers. *Ovary* 2- rarely 3-lobed and -celled, laterally compressed; cells 2-ovuled; style bipartite, the divisions linear, stigmatose on the inner face. *Fruit* a double samara, indehiscent, the wing large, membranous, thickened at the back. *Seeds* exalbuminous; cotyledons irregularly folded; radicle generally long.

ACER NIVEUM, Blume; F. B. I. i. 693.

N. Circars, Madgol Hills of Vizagapatam, about 3,000 ft. (A. W. Lushington).

A large tree with undivided, entire, oblong, acuminate leaves up to 7 in. long, rounded at base and white-glaucous beneath.

Samaras incurved so as to be nearly parallel.

Acer oblongum, Wall., also with undivided leaves, has been introduced from N. India and planted in the Nilgiris with some success.

Family L. SAPINDACEAE.

Trees, shrubs or rarely climbing herbs. *Leaves* alternate, pinnate or rarely simple trifoliate or unifoliate. *Flowers* regular or zygomorphic, generally polygamous. *Calyx* 4-5-lobed

or of 4-5 sepals, usually imbricate. *Petals* 4-5, sometimes 0, generally with scales or tufts of hair above the claw. *Disk* annular or unilateral, rarely (in ♂ flowers) 0, usually lobed. *Stamens* 5-10, usually 8, usually inserted inside the disk or, in zygomorphic flowers, behind it, rarely outside; filaments free, often villous. *Ovary* usually of 3 carpels, 3-celled, often 3-lobed; ovules generally 1, sometimes 2, in each cell. *Fruit* capsular or indehiscent, entire or lobed, sometimes winged. *Seeds* with or without arils, usually more or less globose; albumen 0; embryo with normally curved or convolute cotyledons.

Stamens inserted inside the disk, sometimes unilateral :—

Flowers irregular, zygomorphic; disk usually unilateral :—

Climbing herbs with biternate leaves, the leaflets dentate; fruit a membranous inflated capsule1. **Cardiospermum.**

Erect shrubs or trees :—

Sepals 4, in opposite pairs; leaves 1- or 3-foliolate, the leaflets usually serrate; fruit indehiscent, 1-2-lobed; seeds with a short aril, cotyledons folded2. **Allophylus.**

Sepals 5, imbricate; leaflets entire :—

Leaves paripinnate; fruit 3-celled, not lobed; seeds without aril, cotyledons superposed3. **Lepisanthes.**

Leaves imparipinnate; fruit 1-3-lobed; seeds without aril, cotyledons thick.....4. **Erioglossum.**

Flowers regular; disk annular :—

Ovules solitary; fruit not inflated, indehiscent, carpels drupaceous :—

Fruit entire :—

Petals 0; leaves paripinnate, the rhachis not winged, leaflets usually 3 pairs, broad; ovules erect; seeds arillate, cotyledons conduplicate5. **Schleichera.**

Petals 5; leaves imparipinnate, the rhachis winged, leaflets 6-8 pairs, narrow; ovules pendulous; seeds without aril, cotyledons much crumpled.....6. **Filicium.**

Fruit lobed; leaves paripinnate :—

Drupes smooth :—

Drupes globose or ovoid, united at sides, sometimes later on separating; leaves with 2-3 pairs of thick leaflets

7. **Sapindus.**

Drupes oblong, united at base and diverging :—

Leaves large, with usually 3-5 pairs of long lanceolate leaflets; seeds arillate8. **Thraulococcus.**

Leaves small, sometimes bifoliolate; seeds without aril

9. **Aphania.**

Drupes tubercled or muricate; seeds with a thick fleshy aril

10. **Nephelium.**

Ovules 2 in each cell; fruit a large inflated, 2-lobed capsule; leaves paripinnate with 2-4 pairs of membranous leaflets

11. **Harpullia.**

Stamens inserted outside the disk when present; petals 0; ovules 2 in each cell; fruit a membranous winged capsule; leaves simple, shining, oblanceolate12. **Dodonaea.**

1. **Cardiospermum**, Linn.

Climbing tendril-bearing herbs with wiry stems and branches. *Leaves* alternate, biternate; leaflets coarsely dentate. *Flowers* irregular, polygamo-dioecious, in axillary racemes or corymbs, the lowest pair of pedicels transformed into spiral tendrils. *Sepals* 4, concave, the outer pair small, the inner large. *Petals* 4, in 2 pairs, the two upper near the stamens with a supra-basal scale, the two lower remote from the stamens with a crested inflexed appendage. *Disk* unilateral, of 2 glands opposite to the lower petals. *Stamens* 8, excentric; filaments unequal, free or connate below. *Ovary* 3-celled; style short, 3-fid, the segments bearing inner stigmatic surfaces; ovule 1 in each cell. *Fruit* a membranous, inflated, trigonous capsule, loculicidally 3-valved the valves reticulate. *Seeds* globose, usually with a conspicuous hilum at the base; testa crustaceous; cotyledons large, transversely conduplicate.

Capsules depressed, pyriform, winged at the angles; leaves nearly glabrous, leaflets acuminate at apex; flowers small; seeds black with a large, white, heart-shaped hilum1. *Halicacabum*.

Capsules at first ovate acute, afterwards globose, not winged; leaves pubescent, leaflets usually obtuse, the end one mucronate; flowers moderate-sized; seeds black with a small, orbicular, slightly emarginate hilum.....2 *canescens*.

1. **CARDIOSPERMUM HALICACABUM**, Linn; F. B. I. i. 670; W. & A. 109; Wt. Ic. t. 508.

N. Circars and Carnatic, along the whole Coromandel Coast from Ganjam to Tinnevely; West Coast, in Malabar and Travancore.

The capsules are sometimes small (var. *microcarpum*, Bl.).

2. *CARDIOSPERMUM CANESCENS*, Wall. Pl. As. Rar. i. t. 14; F. B. I. i. 670; W. & A. 109; Wt. Ic. t. 74.

Deccan and Carnatic from the Kistna through Mysore to S. Arcot, usually inland, extending to the N. and E. slopes of Nilgiris.

2. *Allophylus*, Linn.

Shrubs or small trees. *Leaves* alternate, 1- or 3-foliolate; leaflets entire or serrate; stipules 0. *Flowers* small, irregular, polygamodioecious, pedicelled, in fascicles in simple or branched axillary thyrses. *Sepals* 4 in opposite pairs, cucullate, imbricate, the outer pair smaller than the inner. *Petals* 4, small or almost obsolete, generally declinate, naked inside or with a reflexed shaggy scale above the claw. *Disk* unilateral, usually with 4 glands opposite the petals. *Stamens* 8, inserted on the receptacle inside the disk, in ♂ flowers surrounding the ovary. *Ovary* usually 2-lobed and 2-celled, in ♂ flowers merely a pistillode; styles 2, free or connate below, stigmatose on the inner face above; ovule 1 in each cell. *Fruit* indehiscent, 1-2-lobed; lobes subglobose. *Seeds* erect, with a short aril; embryo curved, the cotyledons plicate.

Leaves in all trifoliolate:—

Thyrses shorter than the leaves, sometimes shorter than the petiole, not branched; bark of branchlets whitish; leaflets about 2-5 in. long, serrate crenate-serrate or dentate, usually hoary-tomentose beneath; drupes small1. *serratus*.

Thyrses equalling or longer than the leaves, not or very rarely branched:—

Bark of branchlets brown, young ones and leaves beneath usually tomentose; leaflets about 3-8 in. long, mucronulate-serrate, the nerves reddish; thyrses single, but sometimes one short branch

2. *serrulatus*.

Bark of branchlets white; leaflets glabrous, about 5-7 in. long, ovate-lanceolate, long acuminate; thyrses single or in pairs; drupes rather large, 4 in. long3. *distachys*.

Thyrses longer than the leaves, with few branches chiefly near the base; bark of branches yellowish-brown, the young ones and leaves beneath densely ferruginous-tomentose; side leaflets ovate, end one obovate, all acuminate, 3-6 in. long4. *Rheedii*.

Thyrses longer than the leaves, much branched; bark of branchlets

brown with conspicuous reddish lenticels; leaflets subcoriaceous, glabrous, broadly ovate or lanceolate, obtusely short-acuminate

5. *concanicus*.

1. *ALLOPHYLUS SERRATUS*, Radlk. *A. Cobbe*, Bl.; F. B. I. i. 673, *in part*. *Ornitrophe serrata*, Roxb. Cor. Pl. i. t. 61. *Schmidelia serrata*, var. *a*; W. & A. 110.

Deccan, in the Hills of Kistna, Kurnool and Cuddapah; Carnatic, in Chingleput and Hills westward to the foot of the Pulneys and southwards to Cape Comorin; perhaps on Malabar Coast.

2. *ALLOPHYLUS SERRULATUS*, Radlk. in Rec. Bot. Surv. Ind. iii. 341. *Schmidelia Cobbe*, Wight Ic. t. 964/2.

W. Gháts, in the Nilgiri and Pulney Hills up to 5,000 ft.; probably throughout the W. Gháts but more scarce.

3. *ALLOPHYLUS DISTACHYS*, Radlk. *A. Cobbe*, Bl.; F. B. I. i. 673 *in part*.

W. Gháts, in Coorg, Wynaad and elsewhere, scarce.

4. *ALLOPHYLUS RHEEDI*, Radlk. *A. Cobbe*, Bl.; F. B. I. i. 673 *in part*. *Schmidelia Rheedii*, Wt. Ic. t. 964.

Deccan, Hills of N. Arcot, Bellary, Mysore and Coimbatore at 3,000 ft.; W. Gháts, in the Nilgiris, Anamalais and Travancore Hills up to 5,000 ft.

A large shrub or small tree, very ferruginous-tomentose. Vern. *Mal. Mukannen peru*.

5. *ALLOPHYLUS CONCANICUS*, Radlk.

W. Ghats, in S. Canara (Barber), Malabar (Beddome) and Travancore (Bourdillon).

Var. *lanceolatus*, Gamble, leaflets lanceolate or oblanceolate, coarsely serrate near the apex, obtusely acuminate.

Nilgiris, Anamalai and Pulney Hills (Saulière) up to 4,000 ft.

3. *Lepisanthes*, Bl.

Trees or shrubs. *Leaves* alternate, paripinnate; leaflets entire, subopposite; stipules 0. *Flowers* regular or irregular, polygamodioecious, in axillary or lateral racemes or panicles. *Sepals* 5, widely imbricate, in 2 rows, outer smaller. *Petals* 4, sometimes 5, the 5th small, erect, clawed, each furnished with 1-2 hooded or reflexed, often cristate scales attached to the claw. *Disk* regular or irregular, if the latter, crenately lobed and opposite to the

petals. *Stamens* usually 8, erect, the filaments free, equal. *Ovary* excentric, trigonous, 3-celled; style simple; stigma oblique; ovules in each cell solitary. *Fruit* 3-celled, 3-sided, thickly coriaceous, tomentose or velvety, the cells hirsute within. *Seeds* oblong, exarillate, the hilum linear; testa thick; cotyledons fleshy, obliquely superposed; radicle minute.

Leaflets 2-3 pairs, elliptic-oblong, obtuse or emarginate, rarely acute, 3-10 in. long; flowers 2-3 in. broad; petals with 2 scales, the outer reflexed, the inner lacinate; fruit yellow-velvety, tomentose, depressed at apex when ripe1. *tetraphylla*.

Leaflets 5-7 pairs, oblong or oblanceolate, acuminate, 4-10 in. long; flowers 3-4 in. broad; petals with 1 reflexed scale; fruit hispidly yellow-tomentose, acute at apex2. *deficiens*.

1. LEPISANTHES TETRAPHYLLA, Radlk. *Molinoa canescens*, Roxb. Cor. Pl. i. t. 60. *Hemigyrosa canescens*, Thw.; F. B. I. i. 671; Bedd. Fl. t. 151. *Cupania canescens*, W. & A. 113.

Evergreen dry forests of the E. Coast in the Circars and Carnatic, nowhere very common, ascending to 3,000 ft.

A moderate-sized rather crooked tree with a white hard wood. Vern. *Tel.* Korivi; *Tam.* Nekota.

2. LEPISANTHES DEFICIENS, Radlk. *Hemigyrosa deficiens*, Bedd. Fl. t. 231; F. B. I. i. 671.

W. Ghâts, in evergreen forests in the Wynaad, Anamalais and Hills of Travancore, up to 4,000 ft., scarce.

A small tree with purple flowers and narrow leaflets.

4. Erioglossum, Blume.

Trees or shrubs. *Leaves* alternate, imparipinnate, exstipulate; leaflets opposite or subopposite, entire. *Flowers* irregular, polygamo-dioecious, in elongated erect terminal panicles. *Sepals* 5, unequal, orbicular, concave, imbricate. *Petals* 4, unequal, obovate, the place of the 5th vacant, each petal with a hooded apically lobed woolly scale on the inner face. *Disk* one-sided, lobed. *Stamens* 8, one-sided; anthers oblong; filaments villous. *Ovary* stipitate, obcordate, 3-lobed, 3-celled; style slender; stigma obscurely 3-lobed; ovules solitary. *Fruit* indehiscent, deeply 1-3-lobed, the segments not separating. *Seeds* oblong, exarillate; testa membranous; embryo straight with thick cotyledons.

ERIOGLOSSUM RUBIGINOSUM, Bl. *E. edule*, Bl.; F. B. I. i. 672. *Sapindus rubiginosus*, Roxb. Cor. Pl. i. 44, t. 62; W. & A. 112.

Eastern Gháts, in the Hills of Ganjam and Vizagapatam, up to 2,000 ft.

A good-sized tree, the branchlets young leaves and inflorescence covered with dense golden-brown tomentum. Leaves up to 2 ft. long with about 6 pairs of leaflets. Vern. *Tel.* Ishi rashi.

5. *Schleichera*, Willd.

Trees. *Leaves* alternate, paripinnate, exstipulate, leaflets opposite or subopposite, usually 3 pairs. *Flowers* regular, polygamo-dioecious, small, fascicled in interrupted slender racemes or panicles; pedicels slender. *Calyx* small, cupular; lobes 4-6, usually valvate. *Petals* 0. *Disk* flat, undulate on the margin. *Stamens* 5-8, inserted within the disk; filaments slender, pubescent; anthers oblong. *Ovary* ovoid, narrowed to the rigid style, 3-celled; stigma 3-4-lobed; ovules erect, solitary; in ♂ flowers a villous pistillode. *Fruit* dry, crustaceous, indehiscent, ovoid, acute, tipped with the style, smooth or sometimes more or less echinate. *Seeds* erect, with a fleshy aril; cotyledons conduplicate, unequal.

SCHLEICHERA TRIJUGA, Willd.; F. B. I. i. 681; W. & A. 114; Bedd. Fl. t. 119; Brand. For. Fl. t. 20.

All forest Districts, chiefly in deciduous forests and up to 3,000 ft., common and important.

A large deciduous tree with large leaflets, which are bright red when young. The aril of the fruit, which is about 7 to 1 in. long, is eaten, and the seeds give an oil. The bark is grey and the wood very hard, light reddish-brown, strong and durable and used for rice-pounders, in oil and other mills and for carts. The best lac is produced on its twigs. Vern. *Hind.* Kusam; *Ur.* Kusamo; *Tel.* Puska; *Tam.* Puvan; *Mal.* Puvam; *Kan.* Chakota.

6. *Filicium*, Thw.

Tree, branchlets angular, covered, like the leaves, with waxy scales. *Leaves* alternate, subcoriaceous, imparipinnate; leaflets 6-8 pairs, subopposite, entire, articulate with the broadly-winged

rhachis. *Flowers* small, polygamous, in axillary panicles. *Calyx* 5-lobed; lobes imbricate, deciduous. *Petals* 5, small, imbricate, without scales. *Disk* 5-lobed, tomentose. *Stamens* 5, inserted within the disk; filaments subulate; anthers ovate. *Ovary* sessile, globose, 2-celled, in ♂ flowers merely a pistillode; style hooked; stigma simple or bilobed; ovules solitary, pendulous. *Fruit* a fleshy drupe, 1-2-celled and -seeded; putamen membranous. *Seeds* oblong; testa membranous; cotyledons foliaceous, much crumpled; radicle ascending.

FILICIUM DECIPIENS, Thw.; F. B. I. i. 539; Bedd. Fl. t. 129.

Rhus decipiens, Wt. Ill. i. t. 75; W. & A. 172.

W. Ghâts, from Malabar and Nilgiris to Travancore and Tinnevely, up to about 5,000 ft., in somewhat dry localities, sometimes planted for ornament.

A handsome tree with elegant fern-like leaves up to 15 in. long, the rhachis prominently winged. Wood hard and strong, red. Vern. *Tam.* Ningal; *Mal.* Val muriccha, Niroli.

7. *Sapindus*, Linn.

Trees or shrubs. *Leaves* alternate, paripinnate; leaflets entire, subopposite; stipules 0. *Flowers* regular, polygamous, in terminal and axillary panicles. *Sepals* 5, unequal, in 2 series, much imbricate. *Petals* 4-5 with or without scales on the inner face. *Disk* annular, lobed. *Stamens* usually 8, inserted within the disk; filaments free, usually pilose; anthers oblong. *Ovary* entire or 2-4-lobed, 2-4-celled; style terminal; stigma 2-4-lobed; ovule solitary; in ♂ flowers a villous pistillode with usually 3 styles. *Fruit* fleshy or coriaceous, of 1-3 indehiscent drupes; the drupes ovoid or globose, indehiscent, with saponaceous fibrous pericarp, brittle when dry. *Seeds* usually globose with two integuments, the outer very hard, the inner membranous; cotyledons thick, fleshy, unequal, spirally convolute; radicle inferior, pointed.

Leaflets 2-3 pairs, lanceolate, acuminate at apex, shining above, glabrous or very slightly pubescent beneath; petals softly woolly on the inner surface except the claw, scales minute or absent; fruit of 3 ferruginous-velvety drupes, almost completely combined

1. *laurifolius*.

Leaflets 2-3 pairs, oblong, emarginate at apex, dull above, softly pubescent beneath and on nerves above; petals glabrous on the inner surface except for 1-2 tufts of white hair above the claw; fruit of 3 drupes, combined about half-way up, and then separating, smooth and slightly pubescent when young, later glabrous and wrinkled

2. *emarginatus*.

1. *SAPINDUS LAURIFOLIUS*, Vahl; W. & A. 111. *S. trifolius*, Hiern in F. B. I. i. 682 *in part, not of* Linn.

W. Gháts, from S. Canara and Mysore to the Anamalais and Hills of Madura, in evergreen and open forests at low elevations.

A stout shady tree. The fruit is used, like that of the next, for soap. Vern. *Mal.* Pasakotta.

2. *SAPINDUS EMARGINATUS*, Vahl; W. & A. 111; Bedd. Fl. t. 154. *S. trifolius*, Hiern in F. B. I. i. 682 *in part, not of* Linn.

N. Circars, Deccan and Carnatic, extending to the E. slopes of the Nilgiris and Pulneys and the Hills of Tinnevely, in deciduous and dry evergreen forests, frequent on the coast as at Striharikota in Nellore; frequently planted. The Soapnut.

A common tree, often of large size, chiefly known for its fruits, which are in universal use as a substitute for soap. Bark grey with rough scales. Wood yellow, hard, but little used. Vern. *Hind.* Ritha; *Ur.* Makta maya; *Tel.* Konkudu; *Tam.* Pounanga; *Kan.* Aratala.

8. *Thraulococcus*, Radlk.

Trees or shrubs. *Leaves* large, alternate, paripinnate or reduced to 1 leaflet; leaflets lanceolate, opposite or subopposite. *Flowers* polygamous, in terminal panicles. *Sepals* 5, unequal, concave, imbricate, pubescent. *Petals* 5, obovate, shortly clawed, furnished with a shaggy scale above the claw. *Disk* annular. *Stamens* 8, inserted within the disk; filaments pilose; anthers oblong. *Ovary* 2-3-celled; style short; stigma 3-lobed; ovules solitary. *Fruit* of 1-3 ellipsoidal drupes only slightly connected at the base; pericarp crustaceous, yellow, finely tomentose. *Seed* oblong, covered with a white fleshy aril; testa thin; cotyledons thick, fleshy, unequal, transverse; radicle inferior, pointed.

THRAULOCOCCUS ERECTUS, Radlk. *Sapindus erectus*, Hiern in F. B. I. i. 683. *Nephelium erectum*, Thw.; Bedd. Fl. lxxiv.

W. Gháts, in Wynaad and the Anamalais at 2,000 to 3,000 ft. (Barber).

A large erect shrub with leaves up to 18 in. long, 3-5 pairs of oblong-lanceolate chartaceous glabrous leaflets up to 9 in. long and drupes 1 in. long, usually in pairs.

9. *Aphania*, Blume.

Trees or shrubs. *Leaves* alternate, paripinnate, exstipulate; leaflets 1-6 pairs, sometimes unifoliolate, subopposite. *Flowers* in racemes or panicles. *Sepals* 4-5, petaloid, widely imbricate. *Petals* 4-6, small, with infolded basal auricles or a basal scale. *Disk* regular, slightly lobed. *Stamens* 5-8, rarely 3, inserted within the disk. *Ovary* 1-3- usually 2-celled; style slender, bifid; ovules solitary. *Fruit* fleshy, deeply divided into 2, rarely 3 divergent lobes united only at the base; endocarp thin, cartilaginous or crustaceous. *Seed* exarillate; cotyledons thick.

APHANIA BIFOLIOLATA, Radlk. *Sapindus bifoliolatus*, Hiern; F. B. I. i. 684. *Nephelium bifoliatum*, Bedd. Ic. t. 289.

Kolaimalai Hills in Trichinopoly (Beddome)."

A branching tree reaching 30 ft. in height with one pair of lanceolate leaflets and masses of white blossom.

10. *Nephelium*, Linn.

Trees or shrubs. *Leaves* alternate, paripinnate, exstipulate; leaflets entire, subopposite. *Flowers* small, regular, polygamous, numerous, in terminal and axillary racemes or panicles. *Calyx* 4-6-lobed, usually cupular; lobes short, valvate or slightly imbricate in bud. *Petals* 4-6, often 0, small, villous, rarely with scales. *Disk* annular, fleshy, in the calyx-tube. *Stamens* 6-8, inserted within the disk; filaments slender. *Ovary* pubescent, often verrucose, 2-3-lobed and -celled; style simple, 2-3-lobed; ovules solitary. *Fruit* of 1-3 indehiscent globose or ovoid cocci, smooth tubercled or echinate. *Seeds* ellipsoid or globose, covered by a fleshy arillus; cotyledons thick, fleshy, usually obliquely superposed.

Petals present; leaves up to 18 in. long with 4-10 pairs of leaflets; leaflets oblong-lanceolate to almost linear lanceolate, up to 12 in.

long, glaucescent beneath; calyx deeply lobed, brown-tomentose; fruit with round tubercles or sometimes nearly smooth, red or purple, '5-'7 in. in diam.1. *Longana*.

Petals 0:—

Leaves 3-9 in. long with 2-8 pairs of lanceolate acuminate leaflets, the lowest pair not stipuliform; calyx merely dentate, with golden tomentum; fruit with conical sharp tubercles, red, 1 in. in diam. or more*Litchi*.

Leaves 6-15 in. long with 4-6 pairs of elliptic obtuse leaflets, the lowest pair small, very unequally reniform, stipule-like, the rest large; calyx deeply lobed, villous; fruit densely covered with soft weak prickles, '75 in. in diam.2. *stipulaceum*.

1. *NEPHELIUM LONGANA*, Camb.; F. B. I. i. 688; W. & A. 113. *Euphoria Longana*, Lamk.; Bedd. Fl. t. 156.

W. Gháts, from S. Canara and Mysore to Tinnevely, common in evergreen forests up to 5,000 ft. The Longan tree.

A large handsome evergreen tree, the young leaves red and conspicuous. Bark smooth, yellowish-grey; wood red, moderately hard but little used. The aril of the seed is edible. A common form has the leaflets narrow, linear-lanceolate and the pericarp nearly smooth, but is not distinct. Vern. *Tam.* Puvatti, Katta puvan; *Mar.* Wumb; *Kan.* Kanakindeli; *Mal.* Pasakotta.

2. *NEPHELIUM STIPULACEUM*, Bedd.; F. B. I. i. 690; Bedd. Ic. t. 103, Fl. t. 155.

W. Gháts, in the evergreen forests of Malabar, Travancore and Anamalais up to 3,000 ft.

A moderate-sized handsome tree noticeable for the stipule-like pair of lower leaflets. The wood is reddish-brown and hard. Vern. *Mal.* Paviri mulei.

Nephelium Litchi, Camb., is the tree which gives the delicious fruit Lichi, the transparent aril being the edible part. The tree comes from China and is sometimes planted in gardens.

11. *Harpullia*, Roxb.

Trees. *Leaves* alternate, paripinnate, exstipulate; leaflets opposite and alternate, entire. *Flowers* regular, dioecious or polygamous, in axillary or subterminal racemes or panicles. *Sepals* 4-5, erect, equal, imbricate. *Petals* 4-5, usually clawed,

narrowly obovate, without scales. *Disk* obscure. *Stamens* 5-8, inserted inside the disk; filaments slender; anthers oblong. *Ovary* ovoid, 2-celled; style elongate; stigma linear, usually more or less twisted; ovules 2 in each cell, superposed. *Fruit* an inflated, coriaceous, 2-lobed, 2-celled, loculicidally 2-valved capsule; cells 1-2-seeded. *Seeds* subglobose, usually arillate; embryo with thick hemispheric cotyledons.

HARPULLIA IMBRICATA, Thw.; F. B. I. i. 692; Bedd. Fl. t. 158.

W. Gháts, in evergreen forests from S. Canara to the Anamalais and Travancore, up to 4,000 ft.

A large tree with pinnate leaves up to 16 in. long, 3-4 pairs of membranous, usually lanceolate leaflets up to 7 in. long, flowers with delicate clawed greenish petals and brilliant orange-scarlet inflated 2-lobed capsules. Bark smooth, greenish; wood white, soft. Vern. *Tam.* Nei kottei; *Mal.* Chittila madakku.

12. *Dodonaea*, L.

Shrubs or small trees. *Leaves* alternate, simple or pinnate, exstipulate. *Flowers* small, polygamous, in axillary or terminal racemes or panicles. *Sepals* 2-5, imbricate or valvate. *Petals* 0. *Disk* none in ♂ flowers, small in ♀. *Stamens* 5-10, usually 8, inserted without the disk in ♂ flowers, in ♀ round a small pistillode; filaments short; anthers linear-oblong. *Ovary* 3-6-angled and -celled; style 3-6-sided, 3-6-cleft at top; ovules 2 in each cell, collateral or superposed. *Fruit* a 2-6-sided membranous or coriaceous capsule, septicidally 2-6-valved, the valves winged at the back; cells 1-2-seeded. *Seeds* lenticular or subglobose, compressed, exarillate; funicle thickened; testa crustaceous or coriaceous; cotyledons spirally convolute.

DODONAEA VISCOSA, Linn.; F. B. I. i. 697. *D. Burmanniana*, DC.; W. & A. 114; Wt. Ill. i. t. 52.

N. Circars, Deccan and Carnatic, a common shrub often more or less gregarious; W. Gháts, in Shola forests up to 8,000 ft. and often then a small tree; sometimes planted as a hedge-plant.

A stiff shrub or a small tree with shining simple oblanceolate leaves and 2-3-winged capsules. Bark thin, grey; wood

dark brown, very hard and heavy and useful for tool-handles and walking-sticks. Vern. *Hind.* Sanatta; *Tam.* Virali; *Tel., Kan.* Bhandaru; *Mal.* Vrali.

Blighia sapida, Koen., the Akee fruit, is occasionally cultivated in Madras Gardens.

Family LI. SABIACEAE.

Trees or erect or climbing shrubs. *Leaves* alternate, simple or compound, stipules 0. *Flowers* small, hermaphrodite or polygamous, usually paniced. *Calyx* 4-5-partite, imbricate. *Petals* 3-5, equal or unequal, opposite to or alternate with the sepals, valvate or imbricate. *Disk* usually small, annular. *Stamens* 4-5, opposite to the petals, inserted at the base of or on the disk; all perfect or 2 only perfect and 3 without anthers. *Ovary* 2-3-celled, compressed or 2-3-lobed; styles 2-3, free or connate or 0; stigmas punctiform; ovules 1-2 in each cell. *Fruit* of 1-2 dry or fleshy, globose or compressed drupes. *Seeds* compressed or globose, basilar; hilum broad; testa membranous or coriaceous; albumen 0; cotyledons often contorted; radicle deflexed.

Stamens 4-5 all perfect and equal; drupes compressed; climbing shrubs with simple entire leaves .. 1. **Sabia**.
Stamens 5, 2 only fertile, unequal; drupes subglobose; trees with simple or pinnate leaves, entire or serrate 2. **Meliosma**.

1. *Sabia*, Colebr.

Shrubs, sarmentose or climbing. *Leaves* alternate, simple, entire. *Flowers* usually hermaphrodite, 2-bracteolate, axillary and solitary or in axillary simple or paniced cymes, the bracts, calyx-lobes, petals and stamens all opposite. *Calyx* 4-5-partite. *Petals* 4-5. *Disk* annular, 4-5-lobed. *Stamens* 4-5, inserted at base of the disk. *Carpels* 2, rarely 3, very slightly connate; styles 2, erect, terminal, slightly connate; ovules 2 in each carpel. *Fruit* of 1-2 dry or drupaceous ripe carpels, usually compressed and gibbous with a sub-basal style. *Seeds* reniform, testa coriaceous; embryo curved.

SABIA MALABARICA, Bedd. Ic. t. 177; F. B. I. ii. 2.

W. Gháts, in the Palghat and Anamalai Hills at 3,000-4,000 ft. (Beddome).

A glabrous climbing shrub with elliptic-oblong acuminate leaves, very small flowers in short axillary cymes and flat reticulate reniform drupes.

2. Meliosma, Blume.

Trees or shrubs, usually pubescent. *Leaves* alternate, simple or imparipinnate; if the latter, leaflets subopposite, the terminal rarely wanting; leaves or leaflets sometimes serrate, especially when young. *Flowers* small, irregular, hermaphrodite, in branched terminal or axillary panicles; bracts caducous. *Sepals* and their bracteoles 5-9, persistent, forming an uninterrupted spiral round the petals. *Petals* 3, nearly orbicular, valvate or imbricate. *Stamens* 5; 2 fertile opposite the inner petals, the filaments short, flattened, incurved, furnished at the base with bifid scales expanded upwards in a cup bearing 2 globose anther-cells bursting transversely and springing back elastically; 3 sterile, deformed, opposite the outer petals, bifid, together forming a hood over the pistil. *Disk* annular or cupular with 2-5 simple or dentate teeth. *Ovary* sessile, 2- rarely 3-celled, contracted into a simple or bifid style; stigma simple; ovules 2 in each cell. *Fruit* a small, obliquely subglobose, drupe; stone crustaceous, 1-celled, with a basilar rounded projection within. *Seed* globose; testa membranous; cotyledons conduplicate; radicle incurved.

Leaves simple; ovary glabrous:—

Leaves membranous, obovate or oblanceolate, usually glabrous, serrate only when young; midrib and main nerves raised on the upper surface; panicles puberulous, flowers very small, sepals and bracteoles about 5; drupe .2 in. in diam., stone deeply rugose

1. *simplicifolia*.

Leaves coriaceous; elliptic-oblong or -lanceolate, usually pubescent beneath, midrib and main nerves impressed on the upper surface; panicles densely ferruginous pubescent, flowers rather large, sepals and bracteoles about 9; drupe .3 in. in diam., stone slightly rugose

2. *Wightii*.

Leaves pinnate; leaflets opposite or subopposite:—

Ovary pubescent; leaflets 9-15, lanceolate, entire, pubescent beneath; panicles rusty-pubescent; stone nearly smooth

3. *Arnottiana*.

Ovary glabrous; leaflets 7-15, oblong-lanceolate or -obovate, serrate, nearly glabrous; panicles puberulous; stone rugose

4. *pinnata*.

1. *MELIOSMA SIMPLICIFOLIA*, Walp.; F. B. I. ii. 5. *Millingtonia simplicifolia*, Roxb. Cor. Pl. iii. t. 254; W. & A. 115.

E. Gháts, Madgol Hills of Vizagapatam at 4,500 ft. (A. W. Lushington); W. Gháts, at low elevations and up to 3,000 ft. in evergreen forests in Malabar, Nilgiris, Anamalais to Travancore.

A small tree with reddish moderately hard wood.

2. *MELIOSMA WIGHTII*, Planch.; F. B. I. ii. 4. *Millingtonia pungens*, Wall.; W. & A. 115; Wt. Ic. t. 964, 3.

W. Gháts, at high elevations, usually above 5,000 ft. in the Nilgiri, Anamalai, Pulney and Travancore Hills in Shola forests.

A medium-sized tree with a dark reddish-brown soft wood of little value. Vern. *Badaga* Tode.

3. *MELIOSMA ARNOTTIANA*, Walp.; F. B. I. ii. 6; Bedd. Fl. t. 160. *Millingtonia Arnottiana*, Wt. Ill. i. t. 53. *Sapindus* ? *microcarpus*, W. & A. 112.

W. Gháts, at 4,000-7,000 ft. in Shola forests from S. Canara to Tinnevely, common and conspicuous.

A large tree with thick brown bark and dark reddish-brown soft wood. Vern. *Tam.* Kusavi, Thagari; *Badaga* Huli Makay; *Mal.* Kalavi.

4. *MELIOSMA PINNATA*, Roxb.; F. B. I. ii. 6.

E. Gháts, Madgol Hills of Vizagapatam at 3,000-4,000 ft. (A. W. Lushington).

A medium-sized tree.

Family LII. ANACARDIACEAE.

Trees or shrubs, usually with acrid or resinous juice. *Leaves* alternate or rarely opposite, simple or trifoliolate or imparipinnate, exstipulate. *Flowers* small, regular, hermaphrodite polygamous or unisexual, in a generally paniculate terminal or axillary inflorescence. *Calyx* of 3-5 sepals, sometimes accrescent, sometimes spathaceous. *Petals* 3-5, alternate with the sepals, free, rarely 0, imbricate or valvate. *Disk* flat, cupular or annular, entire or lobed, rarely obsolete. *Stamens* as many as the petals, rarely twice as many, inserted under or rarely on the disk; fila-

ments usually subulate; anthers 2-celled basi- or dorsi-fixed. *Ovary* superior, rarely half inferior, 1- or 2-6-celled, rudimentary or 2-3-fid in the ♂, sometimes of 5-6 free carpels; styles usually combined; stigmas subsessile or capitate; ovules solitary, pendulous from the top or side of the cell or from an ascending basal funicle. *Fruit* superior, rarely inferior, a 1-5-celled, 1-5-seeded drupe; the stone sometimes dehiscent. *Seed* exalbuminous or very nearly so, embryo straight or curved; cotyledons plano-convex; radicle short.

Carpels 5 or 1 only; style lateral; ovule suspended from a basal funicle; leaves simple:—

Carpels 5, 1 only fertile; drupe lenticular, 2-valved 1. **Buchanania.**

Carpel 1:—

Stamens 5-10, 1 only or more fertile:—

Fruit a fleshy drupe; 1 stamen usually only fertile

2. **Mangifera.**

Fruit a reniform nut on a fleshy hypocarp, all or most of the 8-10 stamens fertile3. **Anacardium.**

Stamens 5 fertile; fruit a globose or ovoid drupe.....4. **Gluta.**

Carpels 4-5, rarely 1; style apical; leaves pinnate:—

Petals valvate; leaves usually with an intramarginal nerve:—

Carpels 5; drupe usually large, 1-5 seeded, pericarp fibrous

5. **Spondias.**

Carpel 1; drupe small, 1-seeded, pericarp oily...6. **Solenocarpus.**

Petals imbricate; leaves without intramarginal nerve; drupe compressed.....7. **Odina.**

Carpels 3, rarely 1; style apical or lateral; leaves trifoliolate

8. **Rhus.**

Carpels 3, forming a unilocular ovary; styles apical, free or connate; leaves simple:—

Styles short, terminal; stigma 3-lobed; flowers tetramerous

9. **Nothopogia.**

Styles 3, divergent; stigmas capitate; flowers usually pentamerous:—

Ovary in ♀ or ♂ semi-inferior or superior; petiole without spur-like appendages; fruit with a basal hypocarp...10. **Semecarpus.**

Ovary in ♀ or ♂ inferior; petiole with 2-4 spur-like appendages; fruit partly or wholly enclosed in a hypocarp

11. **Holigarna.**

1. **Buchanania**, Spreng.

Trees. *Leaves* alternate, petioled, simple, usually coriaceous,

quite entire; stipules 0. *Flowers* small, white, hermaphrodite, in terminal and axillary branched panicles. *Calyx* short, 3-5-toothed or -lobed, persistent, imbricate. *Petals* 4-5, ovate or oblong, imbricate, at length recurved. *Disk* thick, urceolate or cupular, 5-lobed. *Stamens* 8-10, free, inserted at the base of the disk; filaments linear; anthers ovate. *Ovary* of 5-6 free carpels, seated in the cavity of the disk, one fertile, the rest imperfect; style short; stigma truncate; ovule 1, pendulous from a basal funicle. *Fruit* a small slightly fleshy lenticular drupe; stone crustaceous or bony, 2-valved. *Seed* gibbous, acute at one end; albumen 0; cotyledons thick; radicle superior.

Inflorescence pubescent; leaves coriaceous:—

Leaves broadly oblong, obtuse or emarginate, over 6 in. long and 2 in. broad, petiole stout, main nerves straight and parallel; flowers 3 in. in diam., the petals oblong; drupe black, 3-6 in. in diam. 1. *Lanzan*.

Leaves narrowly oblong, under 6 in. long, 2 in. broad; petiole rather slender:—

Leaves elliptic-oblong, obtuse or very slightly acute at apex, rusty villous beneath when young, main nerves regular, sub-horizontal, straight and parallel; flowers 2.5-3 in. in diam., the petals oblong 2. *Barberi*.

Leaves oblong-lanceolate, acuminate at apex, glabrous beneath, main nerves ascending, curved and branched; flowers 1.5 in. in diam., the petals ovate obtuse; drupe red, 6 in. in diam.

3. *lanceolata*.

Inflorescence glabrous; leaves scarcely coriaceous, obtuse and emarginate, under 6 in. long, 2 in. broad, main nerves curved, irregular, petiole slender; flowers 2 in. in diam., petals obtuse; drupe black, 5 in. in diam. 4. *angustifolia*.

1. **BUCHANANIA LANZAN**, Spreng. *B. latifolia*, Roxb.; F. B. I. ii. 23; W. & A. 169; Bedd. Fl. t. 165.

Deciduous forests in all Districts, common, up to 4,000 ft. A tree with conspicuous rough bark tessellated in prominent squares, and a greyish-brown moderately hard wood of little value. It gives a copious gum and the kernels of the seeds are collected and eaten. Vern. *Hind*. Piar; *Mar*. Chironji; *Ur*. Charu; *Tam*. Morala; *Tel*. Morli, Sara; *Kan*. Nurkul; *Mal*. Munga péra.

2. *BUCHANANIA BARBERI*, Gamble in Kew Bull. 1916, 135.
Travancore, at Nadarai (Barber).
3. *BUCHANANIA LANCEOLATA*, Wt. Ic. t. 237; F. B. I. ii. 24.
W. Gháts, evergreen forests of Travancore, up to 2,000 ft.
A medium-sized tree. The kernels of the seeds are edible.
Vern. *Mal.* Mala mávu.
4. *BUCHANANIA ANGUSTIFOLIA*, Roxb.; Cor. Pl. iii. t. 262;
F. B. I. ii. 23; W. & A. 169; Wt. Ic. t. 101. *B. intermedia*,
Wt. Ic. t. 81.

Deccan and Carnatic, in dry forests from Hyderabad southwards to Travancore.

A medium-sized tree with rough deeply fissured bark and greyish-brown moderately hard wood of no value. The kernels of the seeds, the best of the three species, are largely collected and eaten. Vern. *Tel.* Morli sara, Pedda morali; *Tam.* Mudamah, Kolamávu—the seeds “Sara pappu.”

2. *Mangifera*, Linn.

Trees. *Leaves* alternate, petioled, coriaceous, simple, entire; stipules 0. *Flowers* small, polygamous, in terminal panicles; pedicels jointed; bracts deciduous. *Calyx* 4-5-partite; segments imbricate, deciduous. *Petals* 4-5, free or adnate to the disk, imbricate, furnished on the inside with a lobed glandular scale or crest. *Disk* fleshy, 4-5-lobed. *Stamens* 1-5, inserted inside or on the disk, 1 sometimes 2 fertile, the others sterile, slender, tipped with a small gland. *Ovary* sessile, 1-celled, oblique; style lateral; stigma simple; ovule pendulous from a basal or lateral funicle. *Fruit* a large fleshy resinous drupe with a compressed fibrous stone. *Seed* large, ovoid-oblong, compressed; testa thin, papery; albumen 0; cotyledons plano-convex, often unequal and lobed; radicle slightly curved upwards.

MANGIFERA INDICA, Linn.; F. B. I. ii. 13; W. & A. 170; Bedd. Fl. t. 162.

Hill forests of the E. Gháts, Deccan and W. Gháts, in ravines up to 4,000 ft.; universally cultivated in gardens, avenues, and “topes,” and run wild. The Mango.

A large spreading evergreen tree reaching 50 ft. in height, the oblong-lanceolate shining leaves crowded at the ends

of the branches; the flowers in dense terminal panicles. Cultivated for its edible, very important fruit, which is eaten fresh, or made into preserves or pickles. Bark rough, dark grey; wood grey, often streaked, moderately hard, used for planking, packing cases, boats, and other purposes. Vern. *Hind.* Am.; *Ur.* Ambo; *Mar.* Ambi; *Tam.* Maá; *Tel.* Mamadi; *Kan.* Mavu.

3. *Anacardium*, Linn.

Shrubs or trees. *Leaves* alternate, petioled, simple, entire; stipules 0. *Flowers* small, polygamous, in terminal bracteate panicles. *Calyx* 5-partite; segments erect, imbricate, deciduous. *Petals* 5, linear-lanceolate, recurved, imbricate. *Disk* filling the base of the calyx, erect. *Stamens* 8-10, all fertile or some sterile, one usually longer than the others; filaments connate at the base and adnate to the disk. *Ovary* obovoid or obcordate, 1-celled; style filiform, excentric; stigma minute; ovule solitary, ascending from a lateral funicle. *Fruit* a reniform nut seated on a large pyriform fleshy body formed of the enlarged disk and top of the peduncle; pericarp cellular and full of oil. *Seed* reniform, ascending; testa membranous, adherent; albumen 0; cotyledons semilunar, radicle short, curved upwards.

ANACARDIUM OCCIDENTALE, Linn.; F. B. I. ii. 20; W. & A. 168; Bedd. Fl. t. 163.

Native of America, cultivated and run wild, especially on the sea coast. The Cashew-nut.

A small tree with short thick trunk, obovate rather large leaves, flowers yellow streaked with pink, in terminal, prominently bracteate, panicles and a greenish-grey nut on a yellow or scarlet fleshy peduncle. Wood reddish-brown, of little use. The nuts are roasted and the kernels eaten for dessert, the peduncles are sometimes eaten but are astringent. The pericarp gives an acrid caustic oil. Vern. *Hind.* Kaju; *Tel.* Jidi mamidi; *Tam.* Kola mávu; *Kan.* Godambe; *Mal.* Paringi mávu.

4. *Gluta*, Linn.

Evergreen trees, with acrid resinous juice. *Leaves* alternate, simple, entire, coriaceous, crowded at the ends of the branches. *Flowers* small, hermaphrodite, in axillary or terminal panicles.

Calyx gamosepalous, spathaceous, splitting irregularly, deciduous. *Petals* 4-6, inserted on the disk and adnate with it below, imbricate, spreading in flower. *Disk* usually elongate, cylindric. *Stamens* as many as the petals and alternate with them; filaments capillary. *Ovary* sessile on the disk or stipitate, oblique, 1-celled; style lateral, filiform; stigma simple; ovule 1, pendulous from a basal funicle. *Fruit* dry, stalked, more or less globose, sometimes furrowed; pericarp thick. *Seed* conform to the pericarp; testa adherent to the pericarp; albumen 0; cotyledons large, thick, plano-convex; radicle short, obtuse, incurved.

GLUTA TRAVANCORICA, Bedd. Fl. t. 60; F. B. I. ii. 22.

W. Ghâts, evergreen forests of South Travancore and Tinnevely up to 3,500 ft.

A very large tree reaching 120 ft. in height and 5 ft. in diam. of bole, with spathulate leaves up to 6 in. long and cream-coloured flowers. The bark is smooth, pinkish-grey, and the heartwood dark red, mottled with orange and black streaks, valuable for furniture and house-fittings. Vern. *Tam.* Shencurani; *Mal.* Thodappei.

5. Spondias, Linn.

Deciduous glabrous trees. *Leaves* usually crowded at the ends of the branches, alternate, imparipinnate; leaflets subopposite, usually caudate-acuminate; stipules 0. *Flowers* small, polygamous, in terminal spreading panicles. *Calyx* small, 4-5-lobed, deciduous, lobes imbricate. *Petals* 4-5, spreading, valvate. *Disk* thick, annular, 8-10-crenated. *Stamens* 8-10, inserted below the disk, filaments slender. *Ovary* shortly ovoid or subglobose, 4-5-celled, immersed in the disk; styles 4-5, conniving above; stigmas spreading; ovule 1 in each cell, pendulous. *Fruit* a fleshy drupe with woody endocarp surrounded by longitudinal interwoven fibres, 1-5-seeded. *Seeds* pendulous, oblong; testa membranous; albumen 0; cotyledons elongate, plano-convex; radicle short, superior.

SPONDIAS MANGIFERA, Willd.; F. B. I. ii. 42; W. & A. 173; Wt. Ill. t. 76; Bedd. Fl. t. 169.

Deciduous forests in almost all Districts, up to about 2,000 ft., but not very common; frequently planted. The Indian Hog-plum.

A large tree in good soil with large leaflets, sometimes 9 in.

by 4 in., but small and with smaller leaflets in poor localities. The leaflets have parallel nerves meeting in an intramarginal nerve. The fruit is eaten. Bark smooth, grey; wood light grey, useless. Vern. *Hind.* Amra; *Ur.* Ambota; *Mar.* Amb.; *Tel.* Aravi mamadi; *Tam.* Kat maá, Mám pulicchi; *Mal.* Ambalam.

S. acuminata, Roxb., seems to be only a small-leaved form of the above.

6. *Solenocarpus*, W. & A.

A tree. *Leaves* alternate, imparipinnate, crowded towards the ends of the branches; leaflets opposite or subopposite, crenulate. *Flowers* small, white, hermaphrodite, in branched panicles terminal on old branches. *Calyx* minute, 5-lobed, imbricate, deciduous. *Petals* 5, ovate, valvate, recurved. *Disk* annular, crenately lobed, surrounding the base of the ovary. *Stamens* 10, inserted at the base of the disk; filaments slender; anthers oblong. *Ovary* free, sessile, 1-celled; style thick, furrowed; stigma oblique, truncate; ovule 1, pendulous from one side near the apex of the cell. *Fruit* a small obliquely oblong, truncate, compressed drupe; pericarp cellular, oily; stone bony. *Seed* linear, compressed; cotyledons linear, plano-convex; radicle very short, superior.

SOLENOCARPUS INDICA, W. & A. 171; F. B. I. ii. 27; Bedd. Fl. t. 233.

W. Gháts, from Coorg to the Anamalais and Hills of Travancore and Tinnevely, up to 2,500 ft., not common.

A tree with about 5-7 pairs of oblong acuminate leaflets up to 4 in. long and 1 in. wide with an intramarginal nerve, white small flowers in conspicuous masses and small fruit.

7. *Odina*, Roxb.

Deciduous trees with stout soft branches. *Leaves* alternate, imparipinnate, clustered at the ends of the branchlets; leaflets opposite, entire; stipules 0. *Flowers* small, monoecious or dioecious, fascicled, shortly pedicelled, in simple or panicled, terminal, fascicled, racemes. *Calyx* 4-lobed, persistent; lobes rounded, imbricate. *Petals* 4, imbricate. *Disk* annular, 8-lobed. *Stamens* 8, inserted below the disk; filaments in ♂ unequal, subulate, the anthers ovate or sagittate, in ♀ very short and

small, the anthers small, sterile. *Ovary* in ♂ abortive, styles 4; in ♀ ovoid or subglobose, 4- but rarely more than 1-celled; styles 4, distant, from the 4 corners of the top of the ovary, erect; stigmas small, peltate; ovules pendulous from near the top of the cell. *Fruit* a small compressed ovoid or obovoid thinly fleshy drupe; stone hard, 1 cell only seed-bearing, irregularly pitted outside. *Seed* compressed, on a funicle; testa membranous; albumen 0; cotyledons plano-convex, curved; radicle thick, superior.

ODINA WODIER, Roxb.; F. B. I. ii. 29; W. & A. 171; Wt. Ic. t. 60; Bedd. Fl. t. 123.

Deciduous forests in most Districts, often planted in avenues. In good soil a large tree, in poor soils often small and stunted, and in some localities as on the East Coast almost evergreen. Leaflets 3-4 pairs, long-acuminate. Bark thick, grey, smooth; wood reddish-brown, fairly good but not much used. The copious gum seems rarely to be collected in S. India. Vern. *Hind.* Thingan; *Ur.* Moi; *Tel.* Gumpini; *Tam.* Wodier, Uthi; *Kan.* Godda; *Mal.* Kalasan.

8. *Rhus*, Linn.

Trees or shrubs, often with acrid juice. *Leaves* alternate, simple 3-foliolate or imparipinnate, the leaflets entire or serrate. *Flowers* small, polygamous, in terminal or axillary panicles. *Calyx* small, 5-partite, the lobes nearly equal, persistent, imbricate. *Petals* 5, spreading, imbricate. *Disk* cupular, lobed. *Stamens* 5, inserted below the disk, in ♂ flowers as long as or longer than the petals, in ♀ flowers minute; filaments subulate; anthers short. *Ovary* sessile, ovoid or globose, 1-celled; styles 3, free or connate; stigmas simple or capitate; ovule pendulous from a basal funicle. *Fruit* a small, dry, compressed drupe; stone coriaceous, crustaceous or bony. *Seed* pendulous from the funicle; testa membranous; albumen 0; embryo curved, with flattish cotyledons; radicle short, superior.

Leaves 3-foliolate; leaflets obovate, the lateral smaller than the terminal;—

Thorny shrub; leaflets prominently sinuate-toothed, the end ones 1-1.5 in. long, the side ones .5-1 in. long.....1. *mysorensis*.
Small unarmed tree; leaflets entire or slightly undulate, the end one 3-5 in. long, the side ones 1-3 in. long.....2. *paniculata*.

1. *RHUS MYSORENSIS*, Heyne; F. B. I. ii. 9; W. & A. 172.

Dry stony lands in the Deccan Hill country extending to the N. slopes of the Nilgiris.

A small shrub with hard reddish-yellow wood. The branches are used for fencing.

2. *RHUS PANICULATA*, Wall; F. B. I. ii. 10.

E. Gháts, Rumpa Hills of Godavari, to 3,000 ft. (Gamble).

A small tree with hard reddish-brown wood.

9. *Nothopegia*, Bl.

Small trees. *Leaves* alternate, opposite or subopposite, coriaceous, entire, petiolate; stipules 0. *Flowers* small, polygamous, bracteate, in short axillary racemes or panicles of racemes. *Calyx* small, 4-lobed, persistent, the lobes imbricate. *Petals* 4, spreading, imbricate. *Disk* annular, 4-lobed. *Stamens* 4, inserted under the margin of the disk; filaments subulate, short in ♂; anthers shortly oblong, introrse, longitudinally dehiscing. *Ovary* abortive in ♂, in ♀ sessile, ovoid, 1-celled; style short; stigma capitate; ovule pendulous from near the top of the cell from a flattened funicle. *Fruit* a globose, acute or depressed, fleshy drupe, tipped with the style, the flesh cellular containing resin. *Seed* pendulous; testa membranous; albumen 0; cotyledons thick, plano-convex; radicle very short, usually basal.

Leaves alternate:—

Drupe with thick pericarp filled with black resin-cells, ovoid, acute at apex; ultimate branchlets pubescent:—

Leaves coriaceous, obovate, shortly and bluntly apiculate, 3–4 in. long by 1–1·5 in. broad, nerves 12–15 pairs, petiole stout, ·3 in. long; ♂ racemes up to 1 in. long, dense, fascicled or paniculate, ♂ shorter; drupe ·5 in. in diam. 1. *Colebrookiana*.

Leaves thinly coriaceous, variable, from linear to lanceolate or elliptic, obtusely acute, 1·5–5 in. long by ·5–1 in. broad, nerves from 15–25 pairs, petiole slender, ·1–·2 in. long; ♂ racemes slender, up to ·5 in. long, ♀ rather long, both sometimes subterminal; drupe under ·4 in. in diam., blue 2. *Heyneana*.

Drupe with thin pericarp, transversely oblong, striate, depressed at apex:—

Leaves and branchlets glabrous:—

Leaves oblong, acuminate, up to 8 in. long by 3 in. broad, nerves strong and parallel, about 20 pairs; petiole twisted,

·5-1 in. long; racemes slender, 2-3 in. long, paniculate; petals glabrous; filaments glabrous or slightly pubescent; drupe red (?)3. *Dalzellii*.

Leaves lanceolate, acuminate or caudate, 3-5 in. long by 1-1·5 in. broad, nerves rather obscure, up to 20 pairs; petiole slender, ·2-·4 in. long; racemes slender, 1-2 in. long, often paniculate; petals glabrous, filaments villous; drupe purple (?)

4. *Beddomei*.

Leaves and branchlets rusty-villous, leaves linear-oblong or lanceolate, abruptly long acuminate; nerves parallel, 25-30 pairs; petiole ·3-·5 in. long; racemes very short, petals densely villous within, filaments villous; drupe blue5. *travancorica*.

Leaves subopposite, linear-oblong or oblong-lanceolate, gradually long acuminate; nerves parallel, 25-30 pairs; petiole stout, very shaggy, ·3 in. long; racemes very short, petals glabrous, filaments slightly villous6. *aureo-fulva*.

1. NOTHOPEGIA COLEBROOKIANA, Blume; F. B. I. ii. 41 *in part only*. *Pegia* ? *Colebrookiana*, Wt. Ic. t. 236.

W. Gháts, in the Sivagiri Hills of Tinnevely (Wight); Nilgiris (Bourne).

2. NOTHOPEGIA HEYNEANA, Gamble. *N. Colebrookiana* var. *Heyneana*, Hook. f. in F. B. I. ii. 40.

W. Gháts, in the Anamalais and Hills of Tinnevely (Beddome, Bourne); Mahendragiri Hill in Ganjam at 4,000 ft. ? (Gamble).

3. NOTHOPEGIA DALZELLII, Gamble. *N. Colebrookiana*, Hook. f. in F. B. I. ii. 40, *in part only*. *Glycycarpus racemosus*, Dalz.; Hook. Ic.t. 842.

W. Gháts, from S. Canara southwards to Nilgiris, Pulneys, Anamalais and Travancore, rising to 5,000 ft.

A small tree with pinkish-yellow hard wood.

Var. *angustifolia*, Gamble. Leaves narrower and less prominently nerved; inflorescence shorter.

Nilgiri and Pulney Hills (Bourne).

4. NOTHOPEGIA BEDDOMEI, Gamble. *N. Colebrookiana*, Hook. f. in F. B. I. ii. 40 *in part*; Bedd. Fl. t. 164.

W. Gháts in the Nilgiri, Coimbatore, Anamalai, Pulney and Tinnevely Hills, up to 5,000 ft.

5. NOTHOPEGIA TRAVANCORICA, Bedd.; F. B. I. ii. 40.

W. Gháts, from S. Canara to Malabar, Travancore and Tinnevely, in hills, up to 3,000 ft.

6. *NOTHOPEGIA AUREO-FULVA*, Bedd. ; F. B. I. ii. 40.

W. Gháts, in hills of Courtallum in Tinnevely (Beddome).

10. *Semecarpus*, Linn. f.

Trees. *Leaves* alternate, simple, entire, coriaceous; stipules 0. *Flowers* small, polygamous or dioecious, in terminal rarely axillary panicles, the ♂ flowers smaller than the ♀ or ♂. *Calyx* usually 5-, sometimes 3-lobed, the segments deciduous. *Petals* 5, rarely 3, ovate or oblong-ovate, imbricate. *Disk* broad, annular. *Stamens* inserted below the disk; filaments filiform, in ♂ flowers as long as or longer than the petals, in ♀ flowers short; anthers usually oblong, in ♂ flowers small and imperfect. *Ovary* in ♂ flowers rudimentary or 0, in ♀ or ♂ flowers superior, 1-celled; styles 3, divergent; stigmas capitate or bilobed, rather large; ovule pendulous from a basal funicle. *Fruit* an oblong or subglobose oblique drupe seated on a fleshy receptacle (hypocarp) formed of the accrescent disk and calyx-base; pericarp thick, with cavities filled with an acrid resin. *Seed* pendulous; testa membranous or subcoriaceous; cotyledons plano-convex; radicle superior.

Leaves and inflorescence pubescent; ovary densely villous:—

Petals 5 in all flowers; leaves obovate-oblong, obtuse at apex, rounded at base, glaucous reticulate and more or less hairy beneath, up to 2 ft. long, 1 ft. broad; drupe black, .75 in. long, on an orange hypocarp as long as the drupe.....1. *Anacardium*.

Leaves and inflorescence glabrous; ovary glabrous or with a few scattered hairs:—

Petals 5 in all flowers; leaves thick, obovate-oblong, obtuse at apex, usually acute at base, dark green reticulate and glabrous beneath, up to 20 in. long, 6 in. broad; drupe very oblique, black, 1 in. long, on a short broad furrowed hypocarp2. *travancorica*.

Petals 3 sometimes 4 in ♂ flowers, 5 in ♀; leaves thin, oblanceolate, auricled at base, acuminate at apex, up to 15 in. long, 3 in. broad; drupe oblique, black, .5 in. long, on a short broad cuplike hypocarp3. *auriculata*.

1. *SEMECARPUS ANACARDIUM*, Linn. f.; F. B. I. ii. 30; W. & A. 168; Roxb. Cor. Pl. i. t. 12; Wt. Ic. t. 558; Bedd. Fl. t. 166.

Deciduous forests in all forest Districts. The Marking-nut tree.

A moderate-sized tree with brown bark and brownish-grey

wood of no value. The pericarp of the drupe gives a marking ink and the hypocarp is edible. Vern. *Hind.* Bhilawa; *Ur.* Bhallia; *Tel.* Jiri; *Tam.* Shenkottei, Thembarai; *Kan.* Gheru; *Mal.* Thenkotta.

2. *SEMECARPUS TRAVANCORICA*, Bedd. Fl. t. 232; F. B. I. ii. 31.

W. Gháts, in the evergreen forests of Travancore and Tinnevely, up to 4,000 ft.

A very large fine tree with grey black-blotched bark and greyish-white wood of no value. Vern. *Tam.* Kattu shenkottei; *Mal.* Avukaram.

3. *SEMECARPUS AURICULATA*, Bedd. Ic. t. 187; F. B. I. ii. 32.

W. Gháts, in the evergreen forests of Travancore and Tinnevely, up to 3,000 ft.

A large handsome tree with panicles of small yellow male flowers and inconspicuous greenish females. Bark grey, smooth; wood soft, greyish-white, useless. Vern. *Tam.* Vellei charei; *Mal.* Charei.

11. *Hologarna*, Ham.

Lofty trees often with acrid juice. *Leaves* alternate, simple, entire, coriaceous or subcoriaceous; petiole with one or two pairs of spur-like deciduous appendages. *Flowers* small, polygamodioecious, in axillary and terminal racemes or panicles. *Calyx* superior, shortly 5-toothed, the tube in ♂ flowers cup-shaped or sometimes subcylindric. *Petals* 5, valvate, cohering at the base and with the edge of the disk, densely villous inside. *Disk* lining the calyx-tube, obscure in ♂ flowers. *Stamens* 5, inserted outside the disk; filaments subulate; anthers oblong-cordiform, versatile, dehiscing longitudinally. *Ovary* in ♂ flowers none, in ♀ flowers inferior, 1-celled; styles usually 3, divergent; stigmas capitate; ovule pendulous from near the top of the cell. *Fruit* a resinous, acrid, compressed, ovoid drupe, partly or wholly enclosed in the accrescent calyx and disk (hypocarp). *Seed* parietal; testa membranous; albumen 0; cotyledons thick, plano-convex; radicle lateral.

Leaves glabrous beneath or midrib slightly pubescent when young, obovate or oblanceolate, not suddenly broadening above the middle, coriaceous, petiole-spurs deciduous; hypocarp quite enclosing the drupe:—

Tomentum of inflorescence pale golden-brown; leaves obtusely acute at apex, up to 10 in. long, oblanceolate, main nerves 16–20 pairs; drupe ellipsoid.....1. *Arnottiana*.

Tomentum of inflorescence dark purple-brown; leaves obtuse or emarginate at apex:—

Petals of ♂ flowers very short, rounded; leaves obovate, up to 7 in. long, 3 in. broad, olive-brown when dry, main nerves about 12 pairs; drupe obovoid2. *ferruginea*.

Petals of ♂ flowers nearly 2 in. long, acute; leaves spatulate, up to 5 in. long, 1.5–2 in. broad, usually nearly black when dry, main nerves 6–9 pairs3. *nigra*.

Leaves pubescent beneath, oblanceolate, suddenly broadened above the middle, usually long acuminate, petiole-spurs persistent; hypocarp enclosing about two-thirds or three-fourths of drupe:—

Leaves up to 18 in. long, 8 in. broad, midrib on upper surface glabrous or only puberulous even when young; petiole-spurs short, golden-tomentose.....4. *Grahamii*.

Leaves up to about 15 in. long, 5 in. broad, midrib on upper surface ciliate with long hairs as are margins, at any rate when young; petiole-spurs slender, long-villous-pubescent5. *Beddomei*.

1. *HOLIGARNA ARNOTTIANA*, Hook. f.; F. B. I. ii. 36. *H. longifolia*, W. & A. 169; Bedd. Fl. t. 107 *not of* Roxb.

W. Coast and W. Gháts, from S. Canara to Malabar and Travancore in low-level forests.

A large tree with black caustic juice which raises blisters and can be used as a varnish. Bark rough; wood greyish-white, soft and useless. Vern. *Kan.* Holigar; *Tam.* Karun charei; *Mal.* Chera.

2. *HOLIGARNA FERRUGINEA*, March.; F. B. I. ii. 37.

W. Gháts, in S. Canara (Beddome), Coorg, Anamalais (Barber).

A large tree of evergreen forests. Vern. *Tam.* Charei.

3. *HOLIGARNA NIGRA*, Bourd. in Ind. For. xxx. 95.

W. Gháts, evergreen forests of Travancore, at 2000–4000 ft.

A large tree reaching 100 ft. in height and 2 ft. in diam. of stem. Bark smooth, grey; wood greyish-white, soft and useless. The juice is black and caustic, and can be used as a varnish. Vern. *Mal.* Chéri.

4. *HOLIGARNA GRAHAMII*, Hook. f.; F. B. I. ii. 37. *Semecarpus Grahamii*, Wt. Ic. t. 235.

W. Gháts, in the Hills of Mysore (Barber); Wynaad (Beddome).

A large tree with large conspicuous leaves.

5. *HOLIGARNA BEDDOMEI*, Hook. f.; F. B. I. ii. 38.

W. Gháts, in the Hills of Malabar, W. Nilgiris, Anamalais and Travancore, in moist forests up to 3,000 ft.

A lofty tree (Beddome), with black juice. Bark smooth; wood light grey, soft and perishable. Vern. *Tam.* Pál vidinyán.

Family LIII. MORINGACEAE.

Trees with soft white wood. *Leaves* deciduous, alternate, 2-3-pinnate, the pinnae and leaflets imparipinnate, opposite, glandular at the base; stipules 0. *Flowers* large, irregular, hermaphrodite, in axillary panicles. *Calyx* cup-shaped, 5-cleft, the segments unequal, petaloid, imbricate. *Petals* 5, unequal, the 2 upper small, the lowest largest. *Disk* lining the calyx-tube. *Stamens* inserted on the margin of the disk, declinate, 5 perfect opposite the petals with 5-7 alternate sterile antherless; filaments free, thickened at base; anthers 1-celled, dorsifixed. *Ovary* stipitate, 1-celled; style slender, tubular; stigma truncate, perforated; ovules many, biseriate, on 3 parietal placentas. *Fruit* an elongate, 1-celled, loculicidally 3-valved, beaked capsule, corky and pitted within. *Seeds* many, in the pits of the valves; testa corky, winged or not, albumen 0; cotyledons plano-convex; radicle very short, superior, plumule many-leaved.

Moringa, Lamk.

Characters of the Family:—

Leaves usually 3-pinnate; leaflets elliptic or obovate, rounded at apex, 5-7 in. long, main nerves obscure; flowers white; seed wings short1. *oleifera*.

Leaves usually 2-pinnate; leaflets broadly elliptic or orbicular, emarginate at apex, 1-1.5 in. long, main nerves distinct; flowers yellow streaked with red; seed wings elongate2. *concanensis*.

1. *MORINGA OLEIFERA*, Lamk. *M. pterygosperma*, Gaertn.; F. B. I. ii. 45; W. & A. 178; Wt. Ill. t. 77; Bedd. Fl. t. 80.

N. Circars, in Ganjam and Godavari, probably, elsewhere cultivated near villages in the plains, wild in N. India. The Horse-radish tree.

A graceful tree with corky grey bark and soft white wood. The root has the flavour of horse-radish and the seeds are eaten in curries, and give a valuable oil. Vern. *Hind*. Sohajna; *Ur*. Munigha; *Tam*. Moringa; *Tel*. Múnga.

2. *MORINGA CONCANENSIS*, Nimmo; *F. B. I.* ii. 45; *Hook. Ic.* t. 2596.

N. Circars and Deccan, from Vizagapatam to Guntur, Kurnool and Coimbatore.

A tree with thick corky bark and white soft wood. Vern. *Tel*. Konda múnga; *Tam*. Kattu moringa.

II. CALYCIFLORAE.

Sepals herbaceous, partially or completely connate in a tube adnate to or enclosing the ovary, persistent or with the upper portion deciduous, rarely free. *Disk* adnate to the calyx-tube and free from the ovary, or adnate both to ovary and calyx-tube, bearing the stamens on its apex; rarely epigynous and within the stamens. *Petals* as many as the sepals or sometimes fewer by suppression, inserted at the apex of the calyx-tube or on the disk lining the calyx, sometimes absent. *Stamens* variously definite or indefinite, inserted on the margin or inner face of the disk, rarely outside the epigynous disk. *Carpels* free or connate, usually inferior or enclosed in the calyx-tube.

Family LIV. CONNARACEAE.

Trees or shrubs, erect or climbing. *Leaves* alternate, 1-3-foliate or imparipinnate; leaflets entire; stipules 0. *Flowers* usually hermaphrodite, regular or somewhat irregular, in racemes or panicles. *Calyx* usually 5-lobed, generally persistent; lobes imbricate or valvate. *Petals* 5, free or slightly connate below, imbricate or rarely valvate. *Disk* small or none, annular or imperfect. *Stamens* 5 or 10, perigynous or hypogynous, sometimes declinate, those opposite the petals usually shorter; filaments filiform, often connate below: anthers short, didymous. *Carpels* 5, rarely fewer or more, 1-celled; styles subulate or filiform; stigmas capitellate, simple or 2-lobed; ovules 2, collateral, ascending, orthotropous. *Fruit* of 1-, rarely 2- or more, sessile or stalked, 1- rarely 2-seeded follicles, dehiscing ventrally.

Seed erect, often arillate; testa thick, sometimes fleshy below; albumen fleshy or 0; cotyledons fleshy in exalbuminous, leafy in albuminous seeds; radicle superior.

Calyx imbricate; seeds exalbuminous, arillate; leaves imparipinnate:—

Calyx accrescent in fruit, clasping the base of the sessile follicle

1. *Rourea*.

Calyx not accrescent, clasping the pedicel of the stipitate capsule

2. *Connarus*.

Calyx valvate; seeds exalbuminous, arillate; leaflet 1

3. *Ellipanthus*.

1. *Rourea*, Aubl.

Trees or shrubs, sometimes scandent. *Leaves* imparipinnate; leaflets subopposite or alternate. *Flowers* small, in axillary panicles; pedicels usually slender. *Sepals* 5, orbicular, imbricate, enlarged in fruit and clasping its base. *Petals* 5, usually linear-oblong, longer than the calyx. *Stamens* 10, filaments filiform, alternately longer and shorter, connate in a ring at the base. *Carpels* 5, of which 4 are usually imperfect; styles slender; stigma capitellate. *Fruit* a sessile curved follicle. *Seed* erect, arillate; albumen 0; cotyledons plano-convex, fleshy; radicle small.

ROUREA SANTALOIDES, W. & A. 144; F. B. I. ii. 47. *Connarus monocarpus*, W. & A. 143, *not of* Linn.

W. Coast and W. side of Ghâts, rising to 3,000 ft., from S. Canara to Travancore.

A climbing or sarmentose shrub with 5–9 elliptic, long- and obtusely-acuminate leaflets and follicles about .75 in. long. The leaves and follicles are rather variable in size and shape. Vern. *Mal. Kuriel*.

2. *Connarus*, L.

Trees or shrubs, often climbing. *Leaves* imparipinnate; leaflets usually 5, sometimes 3, sometimes more, entire. *Flowers* in axillary and terminal branched panicles. *Sepals* 5, connate at base in a short tube, not accrescent, in fruit embracing the base of the fruiting pedicel. *Petals* 5, linear or ligulate or oblong, slightly enlarged upwards. *Stamens* 10, those opposite the sepals with long filaments and perfect anthers, those alternate with them

shorter and sometimes without anthers. *Ovaries* 5, densely pubescent, 4 usually imperfect or obsolete, the fifth with a slender style and capitate stigma. *Fruit* an oblique, stipitate, inflated follicle, the valves glabrous or pubescent within, usually nearly straight on the dorsal, curved on the ventral suture. *Seed* solitary, girt with a fleshy aril at the base; testa smooth, shining; albumen 0; cotyledons plano-convex, fleshy; radicle small.

Valves of the follicle glabrous within, rather thin:—

- Follicle scarlet, turning brown when dry, 1·5–2 in. long, acute at apex, narrowed at base into the pedicel, not striate; leaflets elliptic, obtusely acuminate at apex, rounded at base, with 3–5 pairs of main nerves, not prominently reticulate.....1. *monocarpus*. Follicle bright red, turning brown when dry, 1·5 in. long, keeled on the sutures; acute at apex, narrowed at base into the pedicel, striate; leaflets elliptic-ovate with 5–6 pairs of main nerves, prominently minutely reticulate.....2. *Wightii*. Follicle light brown when dry, turgidly inflated, oblong, 75–1 in. long, obtuse at apex, cordate at base on the top of the pedicel, striate; leaflets elliptic-lanceolate or oblong-lanceolate, acuminate, with 7–8 pairs of main nerves.....3. *Ritchiei*.

Valves of the follicle velvety within:—

- Follicle obovoid, woody, obtuse at apex, narrowed at base into the thick pedicel, 1·5–2 in. long; leaflets coriaceous, coarsely reticulate, elliptic, with about 5 pairs of main nerves, the lowest pair rib-like from the base; panicles thickly rusty-pubescent.....4. *sclerocarpus*. Follicle oblong, obtuse at apex, rounded at base with a short thick pedicel, much inflated, 1–1·5 in. long, striate; leaflets elliptic-ovate, acuminate, with 5–6 pairs of rather obscure main nerves; panicles thinly rusty-pubescent5. *paniculatus*.

1. *CONNARUS MONOCARPUS*, Linn.; F. B. I. ii. 50. *C. pin-natus*, Lamk.; W. & A. 143.

W. Coast, from S. Canara to Travancore, in open forests and waste places.

A low straggling shrub. Vern. *Tam.* Chettupulukodi; *Mal.* Nai kuriel.

2. *CONNARUS WIGHTII*, Hook. f.; F. B. I. ii. 51.

W. Coast in Travancore and W. Gháts to 1,200 ft. (Bourdillon) in evergreen forest.

A large woody climbing shrub.

3. CONNARUS RITCHIEI, Hook. f.; F. B. I. ii. 51.

W. Coast and W. Gháts from S. Canara and Coorg to Travancore.

A climbing shrub or small tree.

4. CONNARUS SCLEROCARPUS, Schellenb. *Rourea? sclerocarpa*, W. & A.

W. Gháts, scarce in the North as S. Canara, common in the Anamalai and Tinnevely Hills up to 3,000 ft.

A large climbing shrub.

5. CONNARUS PANICULATUS, Roxb.; F. B. I. ii. 52.

N. Circars, in Vizagapatam (Beddome).

A large climbing shrub.

3. Ellipanthus, Hook. f.

Trees or shrubs. *Leaves* with 1 leaflet, entire. *Flowers* in short axillary racemes, hermaphrodite or polygamous. *Sepals* 5, valvate. *Petals* 5, imbricate, pubescent, longer than the sepals. *Stamens* 10, 5 long and anther-bearing alternating with 5 short without anthers; filaments subulate, connate in a tube at the base. *Ovary* ovoid, densely villous, attenuate into a short style and lobed stigma. *Fruit* a stalked oblique velvety follicle, valves glabrous within. *Seed* oblong, girt at the base by a fleshy aril; testa of two integuments, outer blackish shining, inner brown leathery; albumen 0; cotyledons plano-convex.

ELLIPANTHUS NEGLECTUS, Gamble in Kew Bull. 1917, 26.

W. Gháts, in the Hills of Travancore and Tinnevely, up to 2,000 ft.

A small tree with elliptic acuminate much reticulate coriaceous leaves, flowers in short rusty-villous racemes fascicled in the leaf-axils and velvety capsule with a large blue-black seed having a pink aril. Vern. *Mal.* Padappen.

Family LV. LEGUMINOSAE.

Herbs, shrubs or trees. *Leaves* alternate, rarely opposite, usually compound; stipules 2, usually free; leaflets often stipellate. *Flowers* usually irregular, hermaphrodite, rarely regular or polygamous, in axillary leaf-opposed or terminal racemes or panicles, rarely solitary, bracteate and usually 2-bracteolate. *Sepals* 5, combined or free, often unequal, sometimes combined

in 2 lips. *Petals* 5, rarely fewer, usually free and unequal. *Stamens* normally 10, rarely fewer, sometimes indefinite, perigynous or subhypogynous; filaments free or variously combined; anthers 2-celled. *Ovary* free, with one or more ovules on the ventral suture; style simple, usually declinate; stigma capitate, terminal or oblique. *Fruit* usually dry, a pod splitting open along both sutures, sometimes continuous and indehiscent, sometimes separating into 1-seeded joints. *Seeds* usually exalbuminous; testa usually hard or leathery, occasionally strophiolate; cotyledons fleshy or leafy, the radicle straight or accumbent.

ANALYSIS OF SUBFAMILIES.

Flowers zygomorphic; stamens definite:—

Corolla papilionaceous; petals imbricate, the uppermost (standard) the outermost, the 4 others in 2 opposite pairs; stamens usually combined.....I. **Papilionatae**.

Corolla not papilionaceous; petals imbricate, the uppermost the innermost, the rest similar to each other; stamens usually free

II. **Caesalpinioideae**.

Flowers regular; stamens definite or indefinite; petals valvate, usually united above the base.....III. **Mimosoideae**.

Subfamily I. **PAPILIONATAE**.

Herbs, shrubs, or trees. *Leaves* alternate, simple or digitately or pinnately compound, rarely bipinnate, sometimes ending in tendrils. *Flowers* irregular, zygomorphic, rarely subregular, hermaphrodite. *Calyx* gamosepalous, 5-toothed or -lobed or the upper lobes more or less connate, or bilabiate the 2 upper opposed to the 3 lower, rarely spathaceous. *Corolla* papilionaceous, petals 5, free or adnate to the staminal tube, the posterior (standard) outside in bud, the 2 lateral (wings) intermediate, the 2 lower inside and usually cohering by their lower margins (keel). *Stamens* 10, diadelphous (usually 9 and 1, the one (vexillary) opposite the standard), monadelphous or free. *Ovary* free; embryo with an inflexed radicle, cotyledons accumbent.

Tribe I. GENISTEAE.—Herbs or shrubs; leaves simple or digitately 3-many-foliolate; stamens monadelphous; pod dehiscent, not jointed:—

Stamens combined in a tube cleft above:—

Anthers uniform; keel petals scarcely cohering1. **Rothia**.

Anthers dimorphous; keel petals cohering in a beak :—

Pod flattened; flowers solitary in the leaf-axils...2. **Heylandia**.

Pod turgid; flowers in terminal or leaf-opposed racemes

3. **Crotalaria**.

Stamens combined in a closed tube :—

Thorny bush; calyx 2-lipped, the upper 2- the lower 3-lobed

Ulex.

Erect shrubs; calyx with 2 upper lobes connate or free, 3 lower connate **Cytisus**.

Tribe II. TRIFOLIEAE.—Herbs; leaves 3-foliolate, the leaflets usually toothed; stamens diadelphous; pod usually dehiscent, not jointed :—

Leaves digitately trifoliolate :—

Petals persistent, adnate to the staminal tube; pod minute, indehiscent 4. **Trifolium**.

Petals caducous, free from the staminal tube; pod linear, 2-valved 5. **Parochetus**.

Leaves pinnately trifoliolate :—

Racemes long; pod short, globose or ovoid 6. **Melilotus**.

Racemes short :—

Pod straight or curved..... **Trigonella**.

Pod spirally twisted **Medicago**.

Tribe III. GALEGEAE.—Herbs or shrubs; leaves imparipinnate, leaflets entire; stamens usually diadelphous; pod usually dehiscent, or if indehiscent usually small, 1-2-seeded or membranous-inflated :—

Anthers apiculate; hairs fixed by the centre :—

Stamens monadelphous, the staminal sheath tubular; leaflets 3, large, toothed..... 7. **Cyamopsis**.

Stamens diadelphous, the vexillary one free; leaves simple, digitate or pinnate, the leaflets usually small, entire

8. **Indigofera**.

Anthers obtuse; hairs basifixed :—

Pod indehiscent, 1-seeded; leaves gland-dotted 9. **Psoralea**.

Pod many-seeded; leaves rarely gland-dotted :—

Inflorescence terminal or leaf-opposed :—

Alternate filaments dilated 10. **Mundulea**.

Filaments not dilated :—

Leaflets parallel-nerved..... 11. **Tephrosia**.

Leaflets with netted venation 12. **Milletia**.

Inflorescence axillary; pod long, septate..... 13. **Sesbania**.

Tribe IV. HEDYSAREAE.—Herbs or shrubs, sometimes twining or

scandent; leaves imparipinnate; stamens diadelphous or monadelphous; pod jointed if more than 1-seeded:—

Leaflets exstipellate:—

Stamens monadelphous:—

Anthers uniform; leaflets 4; slender herb with large ciliate bracts.....14. **Geissaspis**.

Anthers dimorphous:

Calyx-tube short; joints of pod glochidiate, 2-6

15. **Zornia**.

Calyx-tube elongate, slender:—

Joints of pod small, 1-2, rugose, concealed among upper leaves 16. **Stylosanthes**.

Joints of pod large, 1-3, netted, not separating, ripening in the earth **Arachis**.

Stamens diadelphous, 9 and 1; anthers uniform:—

Ovule solitary; pod 1-jointed; leaves 3-foliolate...17. **Lespedeza**.

Ovules 2-4; pod 1-4-jointed; leaves 1-3-foliolate

18. **Taverniera**.

Stamens diadelphous, in 2 bundles of 5 each:—

Pod twisted, enclosed in the calyx, the joints orbicular, turgid or flat; calyx conspicuous, 2-lipped, usually bristly

19. **Smithia**.

Pod straight, exserted from the calyx:—

Calyx 2-lipped; water plants with many close leaflets; joints of pod close together.....20. **Aeschynomene**.

Calyx 5-toothed; dry shrubs with few leaflets; joints of pod oblong, far apart.....21. **Ormocarpum**.

Leaflets stipellate; stamens diadelphous, 9 and 1, sometimes (*Desmodium*) monadelphous:—

Seed solitary, pod flattened; leaflets small, 1-3-foliolate:—

Racemes in terminal, capitate, plumose heads; leaflets longer than broad 22. **Leptodesmia**.

Racemes axillary, lax, with distant flowers; leaflets broader than long 23. **Eleiotis**.

Seeds 2 or more:—

Pod not distinctly jointed, continuous within:—

Pod inflated; leaflets 3, obovate, small 24. **Pycnospora**.

Pod flat, very viscid-pubescent; leaflets 3, rhomboid, large

25. **Pseudarthria**.

Pod distinctly jointed:—

Pod twisted so that the joints come face to face:—

Calyx accrescent, the teeth lanceolate, subequal 26. **Lourea**.

Calyx not accrescent, the teeth setaceous-pointed, especially the lower lip 27. **Uraria.**

Pod not twisted so that the joints come face to face :—

Joints of pod turgid 28. **Alysicarpus.**

Joints of pod flattened :—

Tree; racemes fascicled on the old wood.....29. **Ougeinia.**

Herbs or shrubs; racemes simple or panicled, from the year's shoots, flowers sometimes axillary 30. **Desmodium.**

Tribe V. VICIEAE.—Herbs, low or climbing; leaves paripinnate, the leaflets ending in a tendril or bristle; stamens diadelphous or (in *Abrus*) 9 monadelphous; pod dehiscent, not jointed :—

Stems herbaceous; stamens diadelphous, 9 and 1, or monadelphous, the vexillary one joined to the sheath :—

Leaflets entire; style bearded; seeds with short funicle :—

Staminal tube oblique at mouth; pod compressed :—

Style with dorsal tuft of hairs or bearded round the tip; ovules usually more than 2.....31. **Vicia.**

Style longitudinally bearded along inner face; ovules less than 2 **Lens.**

Staminal tube truncate at mouth; style bearded along inner face :—

Pod compressed; style flat, dilated at tip **Lathyrus.**

Pod turgid; style 3-cornered, dilated upwards throughout

Pisum.

Leaflets toothed; style not bearded; seeds with a slender funicle; pod turgid..... **Cicer.**

Stems woody; stamens monadelphous, the vexillary stamen absent; style not bearded.....32. **Abrus.**

Tribe VI. PHASEOLEAE.—Climbing or prostrate, rarely erect, herbs or shrubs, rarely trees; leaves pinnately trifoliolate, rarely 1- or 5-7-foliolate; stamens monadelphous or diadelphous; pod dehiscent, not jointed :—

Leaves not gland-dotted; leaflets stipellate :—

Style not bearded below the stigma :—

Nodes of raceme not swollen; petals about equal in length :—

Stamens diadelphous; stipules and bracts conspicuous, persistent; leaves 3-foliolate :—

Calyx-teeth distinct; style filiform, without a flattened part in the middle33. **Shuteria.**

Calyx truncate; style filiform with a flattened part in the middle34. **Dumasia.**

Stamens monadelphous, at first at any rate; stipules and bracts small, deciduous:—

Pod not hooked at the apex; anthers all fertile; leaves 3-7-foliolate35. **Glycine**.

Pod conspicuously hooked at the apex; 5 alternate anthers sterile; leaves 3-foliolate36. **Teramnus**.

Nodes of raceme more or less swollen, scarcely apparent in *Galactia*:—

Petals very unequal in length:—

Trees; anthers uniform; standard exceeding the keel and wings37 **Erythrina**.

Climbing shrubs; anthers dimorphous; keel exceeding the wings and standard38. **Mucuna**.

Petals nearly equal in length:—

Stamens diadelphous:—

Herbs; pod linear, 2-valved, many-seeded 39. **Galactia**.

Trees or shrubs; pod woody, lower part thin, seedless, indehiscent, end part 1-seeded, subdehiscent:—

Flowers large, racemose40. **Butea**.

Flowers small, panicled 41. **Spatholobus**.

Stamens monadelphous:—

Upper lip of calyx large, lower minute ...42. **Canavalia**.

Calyx campanulate, teeth subequal, the upper 2 connate
43. **Pueraria**.

Style bearded below the stigma; stamens diadelphous:—

Stigma oblique:—

Keel spiral44. **Phaseolus**.

Keel not spiral45. **Vigna**.

Stigma terminal:—

Petals very unequal in length; flowers large, blue

46. **Clitoria**.

Petals equal in length; flowers yellow, pink or purple

47. **Dolichos**.

Leaves gland-dotted beneath; stipels often wanting; nodes of raceme not swollen; style not bearded below the stigma:—

Ovules 3 or more:—

Pod depressed outside between the seeds:—

Seeds with a large grooved strophiole48 **Atylosia**.

Seeds without strophiole, the hilum large**Cajanus**.

Pod not depressed outside between the seeds ...49. **Dunbaria**.

Ovules 1-2:—

Calyx accrescent50. **Cylista**.

Calyx not accrescent:—

Leaves pinnate; pod compressed51. **Rhynchosia.**

Leaves digitate; pod turgid.....52. **Flemingia.**

Tribe VII. DALBERGIEAE.—Trees or shrubs, sometimes climbing; leaves imparipinnate; stamens monadelphous or diadelphous; pod continuous, indehiscent:—

Leaflets alternate:—

Flowers small, whitish reddish or pale blue; pods oblong or linear; anthers terminal, dehiscing in a vertical slit

53. **Dalbergia.**

Flowers large, yellow; pods suborbicular; anthers versatile, dehiscing longitudinally54. **Pterocarpus.**

Leaflets opposite:—

Pods flattened, thick, almost woody, not winged...55. **Pongamia.**

Pods flat, thin, winged down one or both sides56. **Derris.**

Table VIII. SOPHOREAE.—Trees or shrubs; leaves imparipinnate, rarely simple; stamens free or very slightly connate at base; pod not jointed, indehiscent or 2-valved:—

Stigma terminal; pods usually indehiscent:—

Pod moniliform; calyx-teeth very short57. **Sophora.**

Pod flat, membranous; calyx-teeth short58. **Calpurnia.**

Stigma oblique; pod turgid, dehiscent, fleshy or coriaceous; calyx deeply cleft59. **Ormosia.**

1. *Rothia*, Pers.

Annuals. *Leaves* digitately 3-foliolate, stipules free. *Flowers* small, solitary, or in short racemes from the axils of the leaves. *Calyx*-tube turbinate, teeth subequal, lanceolate, the 2 upper broader and falcate. *Corolla* scarcely exerted, the petals long-clawed, standard ovate or oblong; wings narrow; keel-petals like the wings scarcely cohering. *Stamens* monadelphous; filaments united in a tube cleft above; anthers minute, uniform. *Ovary* sessile, linear, many-ovuled; style straight, filiform; stigma minute, capitate. *Pod* linear, slender, compressed, nearly straight, many-seeded, dehiscing at the dorsal suture. *Seeds* reniform on filiform funicles.

ROTHIA TRIFOLIATA, Pers.; F. B. I. ii. 63; W. & A. 195; Wt. Ic. t. 199.

N. Circars, Deccan and Carnatic, in dry Districts, in fields and on waste land.

A much branched annual with straight flat pods about 2 in. long and small 3-foliate leaves.

2. Heylandia, DC.

A prostrate herb. *Leaves* simple, alternate, entire; stipules 0. *Flowers* small, solitary, axillary. *Calyx*-tube turbinate; teeth lanceolate, 3 lower longer than the 2 subconnate upper. *Corolla* yellow, much exserted; standard orbicular with 2 basal scales at the top of the short claw; wings obovate-oblong; keel petals connate along the back, narrowed to an incurved beak. *Stamens* monadelphous; filaments united in a tube cleft above; anthers alternately short versatile and long basifixed. Ovary sessile, 2-ovuled; style abruptly incurved at base, longitudinally bearded above; stigma terminal. *Pod* flat, oblong, 1-2-seeded. *Seeds* reniform on filiform funicles.

HEYLANDIA LATEBROSA, DC.; F. B. I. ii. 65; W. & A. 180.

All dry Districts, on waste land and in open forest.

A prostrate often very silky-hairy herb with small cordate-ovate leaves, pale yellow flowers and small slightly inflated pod.

3. Crotalaria, Linn.

Herbs or shrubs, or more or less herbaceous undershrubs. *Leaves* simple or trifoliate or sometimes 5-7-digitate; with or without stipules, the stipules sometimes decurrent in wings on the branches. *Flowers* in terminal or leaf-opposed racemes, rarely solitary, usually yellow but sometimes blue, often large and showy. *Calyx*-tube short; lobes linear or lanceolate, subequal or more or less connate in 2 lips. *Corolla* equal to or exceeding the calyx; standard with a short claw and callus above it, usually orbicular or ovate; wings obovate or oblong, shorter than the standard, clawed and usually with minute transverse folds; keel as long as the wings, its petals connate, much incurved, beaked. *Stamens* monadelphous, connate in a sheath cleft above; anthers dimorphous, alternately short versatile with slender filaments and long basifixed with flattened filaments. Ovary sessile or stalked, 2-many-ovuled; style long, abruptly incurved at the base, bearded upwards; stigma small, oblique. *Pod* sessile or stalked, usually globose or oblong, turgid or inflated, continuous within. *Seeds* usually many, rarely 1 or 2, without strophiole; funicle filiform.

Leaves simple, the petiole not articulated :—

Stipules decurrent as a persistent wing to the branchlets; flowers yellow **Alatae.**

Shrub reaching 3–4 ft. in height or more; leaves up to 4 in. long and 3·5 in. broad, elliptic-obovate, obtuse and mucronate at apex, covered with appressed golden shining velvety pubescence; stipular wing gradually expanding to a triangular hooked apex; flowers 1 in. long; pod nearly 2 in. 1. *Wightiana*.

Erect undershrubs up to about 2 ft. in height :—

Leaves densely rusty velvety-pubescent :—

Leaves ovate, acute or obtuse, mucronate, up to 1·5 in. long by 1 in. broad; stipular wing widened upwards into a broad recurved point; flowers 7 in. long; pod 1 in. long

2. *scabrella*.

Leaves elliptic-oblong, acute, up to 9 in. long by 3 in. broad; stipular wing narrow with a small sharp point; flowers 5 in. long; pods up to 1 in. long 3. *conferta*.

Leaves thinly rusty- or grey-pubescent, somewhat glaucous beneath :—

Lower leaves ovate, up to 2 in. long by 1 in. broad, upper ones narrowly linear-oblong, about 1 in. long by 1 in. broad; stipular wing with long erect or slightly recurved auricles; racemes few-flowered; flowers 5 in. long; pod 1·8 in. long

4. *Bidiei*.

Leaves obovate, obtuse or acute, grey-pubescent, up to 3 in. long by 1 in. broad; stipular wing broad, its top shortly auricled; racemes elongate, many-flowered; flowers 5 in. long; pods 1·2 in. long 5. *alata*.

Prostrate or diffuse small undershrubs; racemes few-flowered :—

Stems wiry; leaves ovate elliptic or orbicular, sparsely pubescent, up to 1·2 in. long by 7 in. broad; stipular wing narrow, the auricle triangular; flowers 5 in. long; pod 1–1·3 in. long

6. *ovalifolia*.

Stems almost filiform; leaves orbicular, emarginate, sparsely villous, up to 8 in. long by 6 in. broad; stipular wing very narrow with a short recurved auricle; flowers 6 in. long; pod 1 in. 7. *Bourneae*.

Stipules none or small, not decurrent :—

Racemes all lateral, leaf-opposed, few- often only 1-flowered; mostly prostrate trailing herbs **Diffusae.**

Pod almost globose, hairy; racemes 1–2-flowered, flowers yellow, stipules minute or none :—

Leaves orbicular-ovate to oblong, up to 1 in. long; pod 4 in. by 3 in., covered sparsely with long stiff golden hairs, seeds up to about 20, rather small.....8. *biflora*.

Leaves orbicular, up to 6 in. long and broad; pod 25-3 in. by nearly 25 in., covered thickly with short stiff pale hairs, seeds few, 1-4, large.....9. *globosa*.

Pod oblong:—

Pod glabrous:—

Stipules absent; flowers yellow:—

Pod 25 in. long, 8-10-seeded, shortly stalked; branches long, slender; leaves ovate-cordate, prominently nerved, 3-4 in. long, sparsely hirsute; peduncles and pedicels filiform, 1-3-flowered.....10. *filipes*.

Pod 75 in. long, 16-20-seeded, nearly sessile; branchlets wiry; leaves ovate-oblong, not prominently nerved, 5-15 in. long, densely appressed-hirsute; peduncles slender, 1-4-flowered.....11. *prostrata*.

Stipules present:—

Small prostrate herbs with small flowers about 25 in. long; pod small, about 25 in. long, many-seeded:—

Stipules minute, subulate; leaves round, the base cuneate, those in the centre about 1 in. long, those on the radiating branchlets smaller, all glaucous beneath; flowers about 3-6 at the ends of slender peduncles, sparsely hairy.....12. *humifusa*.

Stipules lanceolate; leaves orbicular-oblong, subcordate and unequal at base, up to 1 in. long, glaucous beneath; flowers in many-flowered, densely silky-haired racemes with short peduncles.....13. *acicularis*.

Larger suberect herb with larger flowers 5 in. long, rusty villous; pod over 1 in. long, very many-seeded:—

Stipules lanceolate, long acuminate; leaves obovate-oblong, obtuse, mucronate, pale beneath, up to 2 in. long; flowers in lax racemes 4-5 in. long

14. *ferruginea*.

Pod hairy, except var. of *C. Fysonii*; leaves stipulate:—

Flowers small, under 3 in. long, the corolla longer than calyx; trailing herbs with stems up to 2 ft. long and very variable membranous leaves from orbicular to oblong and even lanceolate, usually obtuse; racemes 3-8-flowered; pod 75 in. long, reflexed, softly hairy.

15. *evolvuloides*.

Flowers medium-sized, $\cdot 7$ in. long; diffuse perennial herbs:—

Leaves ovate, subcoriaceous, pubescent or glabrous, strongly nerved, obtuse retuse or rarely acute and mucronate, up to $1\cdot 2$ in. long; racemes erect, long-peduncled, 2-8-flowered, the corolla reddish-veined; pod $1\text{--}1\cdot 2$ in. long, cylindric, hirsute or glabrous...16. *Fysonii*.

Leaves obtuse, membranous, variable, from orbicular (lower) to lanceolate (upper), up to 2 in. long, $4\text{--}9$ in. broad; racemes 1-2-flowered with ovate acuminate bracts, the standard veined; pod about 1 in. long, much inflated and very obtuse, sparsely hairy.....17. *bifaria*.

Leaves acute, very membranous, ovate, up to $2\cdot 5$ in. long and $1\cdot 5$ in. broad; racemes slender, 2-3-flowered with recurved lanceolate bracts; pod about 1 in. long, obovoid, attenuate at base, strigosely hirsute; branchlets very silky, suberect.....18. *hirsuta*.

Flowers large, 1 in. long; leaves membranous, ovate, acute, mucronate, up to $2\cdot 5$ in. long, $1\cdot 5$ in. broad, the stipules long-tailed; racemes long, stout, 2-6-flowered, the standard purple-veined; pod $1\cdot 5$ in. long, much inflated, densely strigosely brown-hairy.....19. *multiflora*.

Racemes terminal, many-flowered, rarely in age opposite the leaves:—

Pod glabrous, or very nearly so (also no. 46. *lanata*):—

Whole plant glabrous; stipules none; erect annuals

Glaucæ.

Leaves narrow-lanceolate, membranous, mucronate, up to 6 in. long by $\cdot 75$ in. broad; flowers large, yellow, the veined standard 1 in. long, the calyx lobes lanceolate with filiform tips; pod $1\text{--}1\cdot 5$ in. long, attenuate into the $\cdot 2$ in. stalk, broadening upwards.....20. *lutescens*.

Leaves narrow-linear, membranous, mucronate, up to 8 in. long by $\cdot 25$ in. broad; flowers smaller, the standard $\cdot 75$ in. long, the calyx lobes lanceolate acuminate; pod $1\cdot 5\text{--}2\cdot 5$ in. long, attenuate into the $\cdot 25$ in. stalk, oblanceolate

21. *peduncularis*.

Plants with more or less silky or pubescent foliage:—

Pods 2 or more times longer than the calyx; erect plants with usually elongated racemes **Erectæ.**

Leaves glabrous on the upper surface:—

Scarcely woody; racemes elongate, at least 6 in. long; leaves oblanceolate:—

Stipules and bracts minute, filiform; leaves obtuse or retuse at apex, white-puberulous beneath; pod narrowed at base.....22. *retusa*.

Stipules and bracts ovate-acuminate, reflexed:—

Leaves usually acute at apex, softly grey-pubescent beneath; pod rounded at base and flatly stalked23. *sericea*.

Leaves obtuse at apex, densely ferruginous-silky-pubescent beneath; pod narrowed at base to a flat stalk.....24. *Leschenaultii*.

Woody shrub; racemes dense, short, under 3 in. long; branches, racemes and leaves beneath densely ferruginous-silky; leaves obtuse or retuse; stipules and bracts lanceolate, small25. *formosa*.

Leaves villous on the upper surface:—

Racemes shortly stalked; hairs on the branches and leaves dark brown; pod scarcely 1·5 in. long:—

Leaves oblanceolate-oblong, subacute, mucronate, subcordate at base, up to 3·5 in. long, 1 in. broad, thinly silky above, densely so beneath, margins slightly reflexed; racemes 6–12-flowered, flowers 1 in. long26. *barbata*.

Leaves elliptic, obtuse, up to 1·2 in. long, 7 in. broad, strigosely stiff-hairy on both surfaces, especially beneath, margins prominently reflexed; racemes 3–4-flowered, flowers 75 in. long

27. *scabra*.

Racemes few-flowered, on long stalks; hairs on the branches and leaves golden-brown, shining; leaves oblong or lanceolate, obtuse or acute, up to 2 in. long by 7 in. broad, margin not reflexed; pod about 2 in. long, very broad.....28. *salicifolia*.

Pods shorter or only little longer than calyx, rarely twice as long; diffuse annuals or low shrubby plants

Calycinae.

Upper calyx-lobes connate except at the tip:—

Flowers very small, under 25 in. long, in terminal or leaf-opposed umbels; corolla shorter than calyx:—

Leaves oblong, obtuse, 2–7 in. long; umbels few-usually 3-flowered, mostly leaf-opposed; pod 25 in. long, oblong, 10–12-seeded29. *nana*.

Leaves oblong, usually acute, up to 1·6 in. long;

umbels many- (6-8-) flowered, terminal or with axillary flowers below the terminal umbel also; pod .25 in. in diam., globose, 6-8-seeded...30. *umbellata*. Flowers over .25 in. long, in elongate terminal racemes; corolla equal to or slightly longer than calyx:—

Leaves oblanceolate or linear, obtuse or retuse, mucronate, .1-·3 in. broad; flowers .3 in. long, in slender racemes 4-6 in. or even more long; pod ovoid-oblong, up to .3 in. long, 8-10-seeded

31. *linifolia*.

Leaves obovate, cuneate, emarginate, up to .6 in. broad; flowers .6 in. long, in strong racemes up to 9 in. long; pod oblong, .5-·6 in. long, many- (up to 25-) seeded 32. *tecta*.

Upper calyx-lobes not connate or only connate below:—

Pods longer than the calyx:—

Plants with long silky hairs, brown at any rate when dry:—

Low suffruticose plants with ascending branches; racemes short, subcapitate, few-flowered; flowers .4 in. long; pod oblong, .5 in. by .3 in., seeds 15-20; leaves oblong or oblanceolate, obtuse, up to 2.5 in. long, .7 in. broad, stipules 0 or minute...33. *hirta*.

Erect suffruticose plants; racemes long, with distant flowers; flowers .8 in. long; pod obovoid, 1-1.2 in. by .5 in., seeds very many, more than 30; leaves linear oblong, up to 3 in. long, .4 in. broad, stipules linear, conspicuous 34. *mysorensis*.

Plants with short appressed silky pubescence, grey when dry; stipules 0; pods few-seeded, .4-·5 in. long:—

Low diffuse undershrubs, branched from low down; flowers in racemes terminal on the branches; leaves thick, cuneate, obtuse or emarginate, pellucid-punctate, grey-pubescent, .5-1 in. long by .1-·2 in. broad; flowers .4 in. long

35. *albida*.

Erect subglabrous slender undershrubs; flowers in leafy panicles of racemes; leaves membranous, oblanceolate, obtuse, mucronate, not conspicuously pellucid-punctate, up to 3 in. long by .8 in. broad; flowers .3 in. long 36. *epunctata*

Pods equal to or shorter than the calyx:—

Flowers large, in terminal racemes, the calyx .7–1 in. long; leaves very variable, with minute subulate stipules; standard obovate, rounded or emarginate, with a tuft of hairs at the back, otherwise glabrous; pod 20–30-seeded; whole plant densely appressed-silky.....37. *calycina*.

Flowers moderately large, in terminal heads, the calyx .5 in. long:—

Standard glabrous at the back except for a tuft of hairs near the top; stipules 0; pod about equal to the calyx:—

Standard apiculate; leaves linear-oblongate, up to 2 in. long, clothed like the branches with long pale brown silky hairs; erect plants

38. *chinensis*.

Standard emarginate; leaves suborbicular-obovate, .5–6 in. long, silky-brown-hairy like the branches; low trailing plants, nearly black when dry 39. *priestleyoides*.

Standard and keel densely golden-silky-hairy at the back, like the flowers, leaves and branches; stipules minute; heads densely capitate; leaves 1–1.5 in. long, oblong, obtuse; pod very small, much shorter than the calyx; plant sub-shrubby ...40. *speciosa*.

Flowers small, in oblong dense terminal heads, the calyx .25 in. long; standard oblong, emarginate, glabrous at the back except for a few hairs; stipules minute; pod .25 in. long by .15 in., 6–8-seeded; leaves membranous, obovate, cuneate, 2–3 in. long, 1–1.5 in. broad; erect annuals 1–2 ft. high.....41. *dubia*.

Pod hairy (except No. 46, *lanata*) **Eriocarpeae**.

Flowers in single racemes, terminal or terminal and lateral:—

Annual; very small plants, scarcely 6 in. high; calyx .1 in. long, the corolla slightly larger; pod .2 in. long, oblong, silky-villous; leaves linear, oblong, up to .75 in. long, .1 in. broad; stipules 0 42. *pusilla*.

Slender undershrubs up to about 2 ft. high, the branches 3–4-angled; stipules present, ovate or lanceolate:—

Branches 3-angled, very slender; racemes 2–3-flowered, the flowers under .5 in. long; leaves membranous; pod .5–8 in. long, appressed-silky-villous.....43. *triquetra*.

Branches usually 4-angled, rather stout; racemes 3-8-flowered, the flowers over .5 in. long; leaves chartaceous; pod 1.2 in. long, with spreading silky hairs

44. *Clarkei*.

More or less stout shrubs or undershrubs, sometimes herbaceous, usually with prominent stipules:—

Stipules semi-lunate:—

Stems and branches angular:—

Herbaceous; branches, inflorescence and leaves almost glabrous; flowers usually blue; pod 1-1.5 in. long, minutely pubescent; leaves ovate-deltoid or rhomboid, obtuse or acute; bracts and bracteoles minute 45. *verrucosa*.

Shrubby; branches, inflorescence and leaves beneath softly tomentose; flowers yellow; pod 1.5-2 in. long, glabrous; leaves large, elliptic-ovate or -obovate, apiculate; bracts and bracteoles ovate-lanceolate, acuminate, .2-3 in. long 46. *lanata*.

Stems and branches terete, the uppermost sometimes sulcate; pods sparsely pubescent, 10-12-seeded:—

Corolla yellow; leaves moderately thick:—

Large erect shrub, the branches, inflorescence and undersurface of leaves rusty-villous; standard softly silky-villous without; leaves ovate, obtuse or emarginate, the transverse nervules many and prominent on the pale undersurface; stipules usually large 47. *semperflorens*.

Low herbaceous undershrub, often semi-scandent, the branches, inflorescence and leaf undersurface appressed pubescent; standard only slightly villous without; leaves ovate or lanceolate, acute, mucronate, the transverse nervules few and hardly prominent on the pale undersurface; stipules small

48. *Walkeri*.

Corolla blue or the standard pale yellow or white, the wings blue; a low undershrub, the branches, inflorescence and undersurface of leaves appressed puberulous; standard glabrous without; leaves lanceolate, acute or acuminate, very thin; transverse nervules prominent on upper surface; stipules small

49. *Heyneana*.

Stipules subulate or lanceolate, sometimes 0; stems and

branches furrowed; corolla yellow, large, in long terminal racemes; pod densely dark-brown-velvety:—

Stipules lanceolate, curved or deflexed; a densely brown-silky-tomentose shrub; leaves elliptic-ovate or lanceolate, 1·5–2 in. broad, mucronate; standard slightly villous; pod 1·5–2 in. long50. *obtecta*.

Stipules subulate erect or 0; a thinly pale-brown-silky-pubescent shrub; leaves linear-lanceolate or -oblong, 2·5–1·5 in. broad, obtuse and mucronate or acute; standard glabrous; pod 1–1·25 in. long.....51. *junceae*.

Flowers in panicles:—

Pods long, much longer than the calyx:—

Pods long-stalked, stalk 4 in. long:—

Pedicels of flowers alternate; leaves obovate-oblong, silky-villous with shining hairs; pods nearly glabrous, more than 1 in. long:—

Pods 1 in. long without the stalk; bracts and bracteoles ovate-lanceolate, spreading, more or less deciduous, not shining on upper surface, the bracteoles close under the calyx; calyx-lobes not marginally revolute.....52. *longipes*.

Pods 1–1·5 in. long without the stalk; bracts and bracteoles cordate, acute, reflexed, persistent, shining and viscous on upper surface, the bracteoles 2–3 in. from the calyx; calyx-lobes marginally revolute

53. *shevaroyensis*.

Pedicels of flowers opposite or alternate; leaves oblanceolate, dully pale-brown-villous; pods softly puberulous nearly 2 in. long; bracts and bracteoles broadly ovate, acuminate, recurved, persistent, the bracteoles 1 in. from the calyx; calyx-lobes marginally revolute

54. *subperfoliata*.

Pods sessile or very nearly so, 1–1·2 in. long; leaves golden-silky, often large; bracteoles close under the calyx:—

Bracts and bracteoles ovate-acuminate, more or less deciduous, spreading, not shining and black (when dry) on upper surface; calyx-lobes not prominently revolute.....55. *madurensis*.

Bracts and bracteoles broadly cordate, acute, persistent, shining viscous and black (when dry) on upper surface; calyx-lobes prominently revolute

56. *candicans*.

Pods '8 in. long, longer than the '5 in. calyx; leaves lanceolate, long-villous, 2'5-3 in. long by '5 in. broad; stipules minute or 0; bracts and bracteoles subcordate, acuminate, recurved; seeds 5-7.....57. *sandoorensis*.

Pods short, scarcely, if at all, longer than the calyx:—

Leaves obovate or oblanceolate, densely shining silky, 3-4 in. long by 1-1'5 in. broad; stipules subulate small, or 0; erect shrubs:—

Bracts and bracteoles ovate, erect; upper calyx-lobes obtuse; pods ovoid, '4 in. long with recurved persistent styles, seeds 2.....58. *fulva*.

Bracts and bracteoles ovate, cuspidate, recurved; upper calyx-lobes acuminate; pods oblong, '6-'7 in. long with erect persistent styles, seeds 7-8

59. *pulcherrima*.

Leaves oblong-lanceolate or oblanceolate, mucronate, fulvous-villous, 2-3 in. long by '5 to 1 in. broad; stipules like the bracts; erect undershrubs:—

Bracts and bracteoles lunulate, recurved; pods ovoid, '4 in. long with curved persistent styles, 1-2-seeded

60. *lunulata*.

Bracts and bracteoles very many, conspicuous, linear with reflexed margins, curved; pods ovoid, '4 in. long with recurved styles, 1-2-seeded.....61. *paniculata*.

Leaves linear-cuneate, obtuse, densely soft fulvous villous, up to 1'5 in. long, '25 in. broad; stipules linear, usually 0; bracts and bracteoles ovate, recurved; pods '3 in. long, ovoid, 1-seeded; woody herb...62. *ramosissima*.

Leaves trifoliolate, the petiole articulate.....**Trifoliolatae.**

Seeds 2, the pod obliquely subglobose, small, sessile, beaked:—

Low diffuse perennial herbs, the branches trailing or (in some forms) somewhat ascending; racemes short, few-flowered; leaflets small, obtuse, emarginate, scarcely up to '5 in. long, on very short petioles; corolla '2 in. long; pod '2 in. in diam....63. *medicaginea*.

Erect herbaceous or shrubby perennials:—

Racemes long, 6-10 in., many-flowered; leaflets obovate, emarginate, up to 1 in. long on petioles up to 1'5 in.; stipules minute; corolla '4 in.; pod '2 in. in diam.....64. *trifoliatrum*.

Racemes short, rarely to 6 in. long; stipules linear:—

Branches and leaves softly grey-pubescent; leaflets oblanceolate, obtuse at apex, up to '75 in. long; flowers '3 in. long; pods '2 in. in diam.65. *Willdenowiana*.

Branches and leaves softly yellow-pubescent; leaflets obovate, rounded at apex, up to 1·5 in. long; flowers ¼ in. long; pods ¾ in. in diam. 66. *Notonii*.

Diffuse woody almost spinescent shrubs; leaflets small (¼ in.), obcordate; racemes short, 2-6-flowered; flowers ¾ in. long, standard ovate; pod very small.....67. *rigida*.

Seeds many:—

Pod short, ½-¾ in. long, stalked; seeds 8-11; leaflets obovate:—

Flowers small, ½ in. long, keel shortly beaked, rounded at base; bracts ovate, acuminate, reflexed; leaflets all equal or nearly so; pods cylindric, obtuse at both ends, glabrous, stalk ½ in.....68. *orizensis*.

Flowers medium-sized, ½-¾ in. long, keel long-beaked, narrow; bracts minute, setaceous; mid-leaflet larger than the side ones; pods oblong, narrowed at both ends, acute and beaked at apex, minutely puberulous, stalk ¼ in.....69. *laevigata*.

Pod 1 in. or more long, stalked, seeds more than 10; leaflets usually obovate; bracts small:—

Stalk of pod short, the pods deflexed; flowers medium-sized with prominent curved keel, in elongate stiff terminal racemes:—

Pod and its stalk 1 in. long, clavate, recurved, minutely silky-pubescent, 10-12-seeded; leaflets thick, rather fleshy, emarginate, up to 1·25 in. long 70. *clavata*.

Pod and its stalk 1·5-2 in. long, cylindric-falcate, recurved, puberulous when young, at length glabrous, many-seeded; leaflets membranous, obovate-emarginate or ovate-acute, mucronate, up to 4 in. long 71. *striata*.

Stalk of pod about 1 in. long, the pod cylindric, glabrous, 1·5-2 in. long, 20-30-seeded; flowers very large with prominent incurved keels, in lax racemes; leaflets membranous, 1-2 in. long

..... 72. *laburnifolia*.

Leaves usually 5-, sometimes 3-7-foliolate; pods large, much inflated, hooked at apex, glabrous.....**Multifoliolatae**.

Leaflets 5, linear-oblong or rarely narrow oblanceolate; petioles slender with slender narrowly lanceolate stipules; flowers ½ in. long in slender erect terminal racemes, the bracts linear-lanceolate, reflexed, pedicels ½ in.; pods more or less acute at apex, 2-2·5 in. long by 1 in. broad.....73. *quinquefolia*.

Leaflets 5-7, obovate; petioles long, stout:—

Leaflets glabrous above, appressed silky beneath; stipules and bracts slender, lanceolate, reflexed; flowers ¾ in. long, closely

packed in stout erect terminal racemes, pedicels .3 in.; pods cylindric, obtuse at apex, 2.5 in. long by nearly 1 in. broad

74. *Grahamiana*.

Leaflets densely velvety on both sides with loose tomentum white when fresh turning golden brown; flowers nearly 1 in. long in close terminal racemes, pedicels .7 in.; pods cylindric-clavate, 2-2.5 in. long, obtuse at apex; bracts velvety, lanceolate, recurved

75. *digitata*.

1. CROTALARIA WIGHTIANA, Grah.; W. & A. 181. *C. rubiginosa* var. *Wightiana*, Bak. in F. B. I. ii, 69.

W. Gháts, in the Nilgiri, Pulney and Travancore Hills, at 4,000 to 6,000 ft.; Shevaroy Hills of Salem.

A conspicuous and handsome shrub, with beautiful golden-silky obtuse leaves.

2. CROTALARIA SCABRELLA, W. & A. 181; Fyson Hilltops Fl. 104, t. 77. *C. rubiginosa* var. *scabrella*, Bak. in F. B. I. ii. 69.

W. Gháts, in the Nilgiri and Pulney Hills, on the downs, in grass, at about 6,000 ft.

Similar to the first but smaller and with smaller usually acute leaves.

3. CROTALARIA CONFERTA, Fyson in Kew Bull. 1914, 183; Hillt. Fl. 104.

W. Gháts, in the Pulney Hills at 7,000 ft., on the downs, in grass.

4. CROTALARIA BIDIEI, Gamble in Kew Bull. 1917, 27.

W. Gháts, in the Wynaad and Nilgiri Hills, apparently at about 3,000-4,000 ft.

5. CROTALARIA ALATA, Hamilt.; F. B. I. ii. 69.

N. Circars, in the Hills of Ganjam and Vizagapatam, up to 2,500 ft.

6. CROTALARIA OVALIFOLIA, Wall.; Fyson Hillt. Fl. 102, t. 75. *C. rubiginosa*, Bak. in F. B. I. ii, 69, in part, not of Willd.; Wt. Ic. t. 885.

W. Gháts, Nilgiri and Pulney Hills, 6,000 to 8,000 ft., on the downs, in grass.

7. CROTALARIA BOURNEAE, Fyson in Kew Bull. 1914, 183 Hillt. Fl. 103, t. 76.

W. Gháts, in the Pulney Hills; Nilgiris at 6,000 ft. (Lawson).

8. *CROTALARIA BIFLORA*, Linn.; F. B. I. ii. 66; W. & A. 190.
Deccan and Carnatic, chiefly in open forest lands, up to 3,000 ft., westwards to the E. slopes of the W. Gháts.
A trailing annual.
9. *CROTALARIA GLOBOSA*, W. & A. 190; F. B. I. ii. 66.
Hills of the S. Carnatic, from Dindigal southwards.
A trailing annual, scarcer than the former which it resembles.
10. *CROTALARIA FILIPES*, Benth.; F. B. I. ii. 66.
W. Coast, in S. Canara (Beddome).
A very slender trailer with small bifarious leaves and filiform peduncles.
11. *CROTALARIA PROSTRATA*, Roxb.; F. B. I. ii. 67; W. & A. 189.
E. Coast, on pasture land, especially in N. Circars, but down to Cape Comorin; more scarce in Deccan and on W. Coast.
A somewhat shrubby perennial trailing herb.
12. *CROTALARIA HUMIFUSA*, Grah.; F. B. I. ii. 67.
W. Coast and W. Gháts, in Wynaad, Anamalais and Travancore, in dry forest undergrowth, up to 3,000 ft.
13. *CROTALARIA ACICULARIS*, Ham.; F. B. I. ii. 68.
N. Circars, in Ganjam, in dry forest lands; W. Gháts, in the Anamalai Hills and Travancore, up to 3,000 ft.
14. *CROTALARIA FERRUGINEA*, Grah.; F. B. I. ii. 68. *C. evoluloïdes*, Wt. Ic. 31, *probably*.
W. Coast, in S. Canara (Beddome).
15. *CROTALARIA EVOLULOIDES*, Wt.; F. B. I. ii. 68; W. & A. 188, *excl. syn.*
Carnatic, in Salem and Coimbatore Districts; W. Gháts, in Nilgiris, Malabar, Pulneys and Travancore, up to 5,000 ft., in dry localities.
Var. *acutifolia*, Gamble. Leaves elliptic, acute, mucronate, rather prominently nerved.
W. Gháts, in S.-E. Wynaad.
16. *CROTALARIA FYSONII*, Dunn in Kew Bull. 1914, 26; Fyson Hillt. Fl. 101, t. 74.
W. Gháts, in grass or by roadsides on the downs in the Pulney Hills, up to 7,000 ft., Anamalai Hills (Beddome).
A trailing perennial subshrubby herb.
Var. *glabra*, Gamble. Leaves, flowers, and pod glabrous.
W. Gháts, on the Pulney Downs (Bourne).

17. *CROTALARIA BIFARIA*, Linn.; F. B. I. ii. 69; W. & A. 188, *excl. syn.*; Wt. Ic. t. 30.

Deccan, in Mysore and Bellary; Carnatic, in Tanjore (Wight).

A straggling perennial herb with weak stems and conspicuously inflated and very obtuse pod. The corolla is yellow or blue.

18. *CROTALARIA HIRSUTA*, Willd.; F. B. I. ii. 68; W. & A. 188. Deccan, from the Godavari through Kistna and Guntur to Cuddapah.

A subshrubby species with rather large very membranous leaves and stems covered with spreading hairs, the stipules and bracts reflexed.

19. *CROTALARIA MULTIFLORA*, Benth.; F. B. I. ii. 69.

W. Gháts, in the Anamalai Hills, at 5,000 ft. (Beddome).

A subshrubby species with large flowers, apparently scarce.

20. *CROTALARIA LUTESCENS*, Dalz.; F. B. I. ii. 74.

W. Coast, in S. Canara, at Karkal (? Karikal) (Lawson).

An erect annual, reaching 3 ft. in height. It is common in the Konkan so is likely to occur in S. Canara. Flowers yellow.

21. *CROTALARIA PEDUNCULARIS*, Grah., F. B. I. ii. 74; W. & A. 186. *C. elegans*, Bedd. Ic. t. 106.

W. Gháts, in Coimbatore, Nilgiris, Anamalais and Travancore, up to 5,000 ft., in grassy places.

An erect annual with grass-like leaves and yellow flowers.

22. *CROTALARIA RETUSA*, Linn.; F. B. I. ii. 75; W. & A. 187.

In all Districts, in fields, waste places and open forest lands.

An erect herbaceous undershrub reaching 3-4 ft. in height with conspicuous yellow flowers. It gives a fibre.

23. *CROTALARIA SERICEA*, Retz.; F. B. I. ii. 75; W. & A. 186.

N. Circars, in Ganjam, in forest regions up to 2,500 ft.

An erect herbaceous undershrub, corolla yellow with a purple tinge.

24. *CROTALARIA LESCHENAULTII*, DC.; F. B. I. ii. 76; W. & A. 186.

W. Gháts, in the Nilgiri and Pulney Hills at elevations above 5,000 ft.; Shevaroy Hills of Salem (Lawson).

- An erect herbaceous undershrub with yellow flowers tinged outside with brown or red.
25. *CROTALARIA FORMOSA*, Grah.; F. B. I. ii. 76; W. & A. 181; Wt. Ic. t. 980; Fyson Hillt. Fl. 107. t. 79.
W. Gháts, on the Nilgiris in Sholas and on the open downs above 7,000 ft.
A low-growing handsome shrub with yellow flowers and dense tawny pubescence.
26. *CROTALARIA BARBATA*, Grah.; F. B. I. ii. 76; W. & A. 181; Wt. Ic. t. 980; Fyson Hillt. Fl. 108, t. 80.
W. Gháts, in the higher Shola forests of the Nilgiris at 6,000–8,000 ft.
A large shrub with conspicuous bright yellow flowers and characteristic dark brown silky pubescence.
27. *CROTALARIA SCABRA*, Gamble in Kew Bull. 1917, 28.
W. Gháts, on Agastyamalai Peak, Tinnevely (Barber) at about 6,000 ft.
Apparently a good-sized shrub.
28. *CROTALARIA SALICIFOLIA*, Heyne; F. B. I. ii. 77; W. & A. 182.
W. Gháts, from Coorg through Wynaad to Travancore.
An erect herbaceous undershrub with bright yellow flowers and much golden-brown pubescence.
29. *CROTALARIA NANA*, Burm.; W. & A. 191; F. B. I. ii. 71 *in part*.
Carnatic, near the coast; W. Coast and W. Gháts, at low levels in dry localities.
A prostrate annual plant, with often erect branches.
30. *CROTALARIA UMBELLATA*, Wight; W. & A. 191. *C. nana*, Burm.; F. B. I. ii, 71 *in part*.
W. Gháts, in the Hills from S. Canara and Mysore southwards, up to 6,000 ft.; Shevaroy Hills of Salem.
An erect bushy plant, apparently perennial.
31. *CROTALARIA LINIFOLIA*, Linn. f.; F. B. I. ii. 72; W. & A. 190 *excl. syn.*
N. Circars, in Godavari; Deccan, in Mysore; Carnatic, in Chingleput and S. Arcot.
An annual slenderly-branched plant.
32. *CROTALARIA TECTA*, Roth; F. B. I. ii. 72. *C. viminea*, Grah.; W. & A. 189.

W. Ghâts, at the foot of the Pulney Hills (Bourne), Nagarcoil in Travancore, plains of Tinnevely.

A low undershrub.

33. *CROTALARIA HIRTA*, Willd.; F. B. I. ii. 70; W. & A. 182.

N. Circars, in Godavari; Salem District in Carnatic; at low levels.

A low small straggling undershrub.

34. *CROTALARIA MYSORENSIS*, Roth; F. B. I. ii. 70; W. & A. 182.

Deccan and Carnatic, in hilly country, up to 4,000 ft.; W. Ghâts, in the Nilgiris, Anamalais, Pulneys and Hills of Travancore, up to 4,000 ft.

An erect densely silky plant, the hairs at first silvery, turning brown in drying.

35. *CROTALARIA ALBIDA*, Heyne; F. B. I. ii. 71; Fyson Hillt. Fl. 105, t. 78. *C. montana*, Roxb.; W. & A. 182.

N. Circars, in the Hills of Ganjam and Vizagapatam up to 4,500 ft.; W. Ghâts, in the Nilgiri and Pulney Hills up to 7,000 ft.

A bushy twiggy undershrub with pale yellow flowers and small grey-pubescent thick leaves.

36. *CROTALARIA EPUNCTATA*, Dalz. *C. albida* var. *epunctata*, Baker in F. B. I. ii. 71.

N. Circars, in the Hills of Ganjam up to 4,500 ft. in open forest; W. Ghâts, Hills of Tinnevely.

An erect slender branching undershrub, with membranous leaves.

37. *CROTALARIA CALYCINA*, Schrank; F. B. I. ii. 72. *C. anthylloides*, W. & A. 181.

Almost all Districts in hilly country, among grass and in open forest lands.

An annual plant reaching 2 ft. or even more in height at low levels, but at high levels reduced to about 6 in. The flowers and fruit are constant, but the leaves are very variable and form 4 fairly well-marked groups:—

Group 1 (*anthylloides*).—Tall plants, leaves linear, 2–6 in. long, .2–.4 in. broad, usually glabrous above.

Group 2 (*Roxburghiana*).—Tall plants, leaves elliptic-lanceolate, 1–2 in. long, .6–.7 in. broad, usually glabrous above.

Group 3 (*crinita*).—Low plants with erect branches, leaves linear-oblong, 1–2 in. long, 1–2 in. broad, strigosely hairy above.

Group 4.—Low plants, branches scarcely 6 in. long, leaves oblong, 5–8 in. long, 1–3 in. broad, strigosely hairy above.

The last group is only found at high levels. Fyson says it is called “Rabbits’ ears” on the Pulneys.

38. *CROTALARIA CHINENSIS*, Linn.; F. B. I. ii. 73.

W. Gháts, in Malabar and Coorg, in scrub forest up to 4,000 ft.

An erect annual about 2 ft. high, with yellow flowers and golden-brown hairs.

39. *CROTALARIA PRIESTLEYOIDES*, Benth.; F. B. I. ii. 74.

W. Gháts, in the Nilgiri and Anamalai Hills (Wight, Beddome), Bababudan Hills of Mysore, up to 5000 ft.

A low trailing undershrub with long dark hairs and capitate flowers.

40. *CROTALARIA SPECIOSA*, Heyne; F. B. I. ii. 73.

Deccan Hills, in the Ceded Districts and Mysore; Nagari Hills of N. Arcot and Kambakam Hills of Chingleput.

An erect woody undershrub with beautiful silky leaves and capitate flowers having a silky standard and large lanceolate bract and bracteoles.

41. *CROTALARIA DUBIA*, Grah.; F. B. I. ii. 73.

W. Gháts, in Wynaad and Anamalais and Hills of Cochin at about 3,000 ft., in dry forest undergrowth.

An easily recognised species with dense heads of small flowers and rather large leaves.

42. *CROTALARIA PUSILLA*, Heyne; F. B. I. ii. 70; W. & A. 189.

Deccan and Carnatic, on dry waste lands.

The smallest species of the genus.

43. *CROTALARIA TRIQUETRA*, Dalz.; F. B. I. ii. 71.

W. Gháts, in S. Mysore and Nilgiris, at about 3,000 ft.

A very slender plant with white or pale yellow flowers.

44. *CROTALARIA CLARKEI*, Gamble in Kew Bull. 1917, 27.

W. Gháts, in the Nilgiri, Pulney and Tinnevely Hills, up to 5,500 ft.

A much stouter plant than the preceding, with yellow flowers and thicker leaves.

45. CROTALARIA VERRUCOSA, Linn.; F. B. I. ii. 77; W. & A. 187; Wt. Ic. t. 200.

Almost all Districts, a weed of roadsides, waste places, gardens and fields.

A much-branched herbaceous, usually annual, plant with blue, sometimes white, flowers.

46. CROTALARIA LANATA, Bedd. Ic. t. 105; F. B. I. ii. 77.

W. Gháts, Anamalai, Pulney and Travancore Hills at 3,000 to 4,000 ft.

A shrub, reaching 12-15 ft. in height.

47. CROTALARIA SEMPERFLORENS, Vent.; F. B. I. ii. 78; W. & A. 187. *C. Wallichiana*, W. & A. 187; Wt. Ic. t. 982.

W. Gháts, in the Nilgiri and Pulney Hills, at high levels, above 6,000 ft.

A very conspicuous shrub on the borders of Sholas and by roadsides.

48. CROTALARIA WALKERI, Arn.; Trimen Fl. Ceyl. ii. 16, t. 26. *C. semperflorens* var. *Walkeri*, Baker in F. B. I. ii. 78.

W. Gháts, in the Nilgiri and Pulney Hills, at low levels, up to 6,000 ft.

A low undershrub with yellow flowers and smaller leaves than the preceding.

49. CROTALARIA HEYNEANA, Grah.; F. B. I. ii. 78; W. & A. 187.

W. Coast, in Malabar and Travancore; W. Gháts, in S. Canara, S. Mysore, Wynaad and Anamalais, to 3,000 ft.

A low undershrub with blue flowers, very membranous leaves and terete branches.

50. CROTALARIA OBTECTA, Grah.; F. B. I. ii. 79; W. & A. 185; Wt. Ic. t. 208 and t. 383.

W. Gháts, in Nilgiris, above 4,000 ft.

A large shrub with conspicuous flowers and pods and velvety foliage.

Var. *glabrescens*, Baker, branches and leaves glabrescent.

W. Gháts, in the Tinnevely Hills, about Courtallum, Sispara Ghát in Nilgiris, etc.

51. CROTALARIA JUNCEA, Linn.; F. B. I. ii. 79; W. & A. 185; Roxb. Cor. Pl. ii. t. 193.

All Districts, possibly wild in the Circar Hills and W. Gháts,

but more usually found run wild; cultivated especially in the Circars and Deccan. Sun-hemp.

A tall shrub reaching 8 ft. in height, with prominently grooved and striated stems; cultivated for its valuable fibre. Vern. *Hind.* Sunn; *Tel.* Shanama; *Tam.* Janupa, Wuckoo.

52. *CROTALARIA LONGIPES*, W. & A. 183; F. B. I. ii. 76.
Carnatic, in the Kollaimalai Hills of Salem (Wight).
53. *CROTALARIA SHEVAROYENSIS*, Gamble in Kew Bull. 1917, 28.
Shevaroy Hills of Salem (Bidie, Bourne); Madura District (Beddome).
54. *CROTALARIA SUBPERFOLIATA*, Wight; F. B. I. ii. 79; W. & A. 184.
W. Gháts, on the E. slopes of the Pulney and Tinnevely Hills, Hills of Travancore.
A tall species, at once recognised by the slender racemes with obtuse opposite bracts and usually opposite pedicels.
55. *CROTALARIA MADURENSIS*, Wight; F. B. I. ii. 79; W. & A. 184.
W. Gháts, in the Nilgiri and Pulney Hills, on open downs, up to 6,000 ft.
A very fine tall-growing handsome plant with yellow flowers.
56. *CROTALARIA CANDICANS*, W. & A. 184. *C. madurensis*, Wt.; F. B. I. ii. 79 *in part*.
W. Gháts, in the Nilgiris, at about 6,000 ft.
57. *CROTALARIA SANDOORENSIS*, Bedd.; Gamble in Kew Bull. 1917, 29.
Deccan, Sandúr Hills of Bellary (Beddome).
An erect viscous undershrub with very short fulvous hair.
58. *CROTALARIA FULVA*, Roxb.; F. B. I. ii. 80; W. & A. 183.
Deccan, Hills of Mysore; W. Gháts, in Wynaad and Nilgiris, up to 6,000 ft., scarcer to south.
A handsome shrub with golden silky hairs, erect bracts and yellow flowers in close panicles.
59. *CROTALARIA PULCHERRIMA*, Roxb.; F. B. I. ii. 80; W. & A. 184; Wt. Ic. t. 481.
Hills of the Deccan and Carnatic, from Kambakam in Chingleput to Ramandrug in Bellary, up to 4,500 ft.; Nilgiris.

A very handsome viscous shrub with bright yellow flowers and conspicuous reflexed bracts on the elongated branches of the panicles.

60. *CROTALARIA LUNULATA*, Heyne; F. B. I. ii. 80; W. & A. 183; Wt. Ic. t. 480.

Deccan, Muchukota in Anantapur; Carnatic, Hills of Chingleput, Tanjore.

An erect undershrub, very sticky; flowers yellow; in elongate panicle-branches.

61. *CROTALARIA PANICULATA*, Willd.; F. B. I. ii. 81; W. & A. 183.

Deccan, dry tracts in Cuddapah, and South to Salem; old forts in Bellary, Kistna and Guntur; Carnatic, coast region from Madras southwards.

A sticky, bad-smelling, erect undershrub with many linear bracts and stipules and yellow flowers.

Sometimes the bracts below the flowering ones are in threes, the middle one ovate acuminate, the others linear, and the stipules are often in fascicles. The tomentum is grey at first but changes on drying.

62. *CROTALARIA RAMOSISSIMA*, Roxb.; F. B. I. ii. 80; W. & A. 183.

Deccan, in dry stony lands from the Godavari to Cuddapah and Mysore.

A low much-branched woody herb with much silky hair, very sticky; panicles short, close. Flowers yellow, tinged with purple.

63. *CROTALARIA MEDICAGINEA*, Lamk.; F. B. I. ii. 81; W. & A. 192. *C. neglecta*, W. & A. 192. *C. herniarioides*, W. & A. 192.

A common very variable plant, found in three fairly well-marked varieties, which, however, are more or less connected by intermediates.

Branches prostrate, weak, very slender, with slender filiform divaricating branchlets and pedicels and racemes with only 2-3 flowers; the leaflets narrow oblanceolate

var. 1. *typica*.

Branches prostrate and somewhat ascending with shorter branchlets and pedicels and 6-9-flowered racemes; the leaflets obovate, broader.....var. 2. *neglecta*.

Branches very long, prostrate, racemes terminal, about 8-flowered; leaflets obcordate, about .25 in. long

var. 3. *herniarioides*.

Variety 1 seems to be scarce and chiefly confined to the coast of the Carnatic; variety 2 is common in the Deccan and Carnatic to the Eastern slopes of the W. Gháts, in dry localities and up to 3,000 ft.; variety 3, the best marked, chiefly occurs on sandy tracts near the sea coast of Coromandel, making large flat rosettes of some size from a thick rootstock.

64. *CROTALARIA TRIFOLIASTRUM*, Willd.; F. B. I. ii. 82; W. & A. 191; Wt. Ic. t. 421.

N. Circars and Carnatic, near the coast, from Ganjam to Madras.

An erect perennial with yellow flowers in long racemes, reaching 2-3 ft. in height.

65. *CROTALARIA WILLDENOWIANA*, DC.; F. B. I. ii. 81; W. & A. 191.

Carnatic, in the plains and low hills from the Kistna southwards.

An erect perennial with soft grey-villous foliage and yellow flowers.

66. *CROTALARIA NOTONII*, W. & A. 192; F. B. I. ii. 82; Wt. Ic. t. 752. *C. rostrata*, W. & A. 191.

W. Gháts, in the Nilgiri and Anamalai Hills, at elevations of 4,000 to 6,000 ft.

A pretty erect shrub with yellowish pubescence and bright yellow flowers.

67. *CROTALARIA RIGIDA*, Heyne; F. B. I. ii. 82; W. & A. 191.

Sea coast of the Carnatic from the Kistna to Negapatam, rarer inland from Coimbatore to Tinnevely.

A rigid stiff shrub with many thorny-looking branches.

68. *CROTALARIA ORIXENSIS*, Rottl.; F. B. I. ii. 83; W. & A. 193.

N. Circars and Carnatic, scarce.

A diffuse herbaceous much-branched perennial.

69. *CROTALARIA LAEVIGATA*, Lamk.; F. B. I. ii. 83. *C. stipitata*, W. & A. 193.

W. Gháts, from S. Canara to Nilgiris and Anamalais, up to 3,000 ft.

A small erect shrub with yellow flowers.

70. CROTALARIA CLAVATA, W. & A. 194; F. B. I. ii. 83.

Carnatic, from Coimbatore southwards, on and near the eastern slope of the Gháts, up to 2,000 ft.

A low shrub, flowers yellow.

71. CROTALARIA STRIATA, DC.; F. B. I. ii. 84.

N. Circars, at Chatrapur in Ganjam; W. Coast, in Travancore.

An erect herbaceous shrub, reaching 4 ft. in height, with flowers yellow striped with red.

Var. *acutifolia*, Trim. in Fl. Ceyl. ii. 19. Stems stouter, leaflets larger, ovate, acute, mucronate, on long stout petioles; racemes more densely flowered.

W. Coast in S. Canara (Beddome, Barber); Nilgiris below Coonoor (Fischer); Bangalore, in Mysore (Cameron).

An erect shrub, reaching 5 ft.; flowers yellow striped with purple.

72. CROTALARIA LABURNIFOLIA, Linn.; F. B. I. ii. 84; W. & A. 193.

N. Circars and Carnatic, especially near the coast; Deccan, in Mysore; W. Coast at Quilon, Travancore.

An erect shrubby perennial with large yellow flowers and conspicuously long-stalked pod.

73. CROTALARIA QUINQUEFOLIA, Linn.; F. B. I. ii. 84; W. & A. 194; Wt. Ic. t. 16.

Carnatic, W. Coast and W. Gháts, up to 3,000 ft., chiefly growing in wet rice fields.

An erect annual with fairly large yellow flowers.

74. CROTALARIA GRAHAMIANA, W. & A. 194; F. B. I. ii. 85.

W. Gháts, in the Anamalai and Pulney Hills and Hills of Travancore and Tinnevely, up to 6,000 ft.

An erect undershrub with yellow flowers and shining silky pubescence.

75. CROTALARIA DIGITATA, Hook. Bot. Misc. ii. t. 16; F. B. I. ii. 85; W. & A. 194.

Carnatic, Kollaimalai Hills of Salem District (Wight).

A low erect very velvety shrub with yellow flowers.

Ulex europaeus, Linn., the "Gorse" or "Furze," has become completely naturalized on the Nilgiri and Pulney Hills at high levels. Two species of *Cytisus*—*C. albus*, Link., the White Broom, with white flowers, and *C. monspessulanus*, Linn., a soft-

leaved shrub with yellow flowers and silky pod—are found run wild on the Nilgiri Hills. The former is a native of Algeria; the latter common in the S. of France and other Mediterranean regions.

4. *Trifolium*, L.

Herbs. *Leaves* digitately trifoliolate, the stipules adnate to the petiole. *Flowers* usually red or white, sometimes yellow, in dense axillary heads spikes or umbels, rarely solitary. *Calyx*-tube campanulate; lobes 5, subequal, the lower ones sometimes longer. *Corolla* adnate to the calyx-tube and fading without falling; standard and wings narrow; keel straight, obtuse. *Stamens* diadelphous; filaments more or less dilated; anthers uniform. *Ovary* sessile or stalked, with few ovules; style filiform, incurved above the base; stigma oblique. *Pod* minute, included, membranous, indehiscent, 1- or few-seeded.

Flowers red, in dense rounded heads about 1 in. in diam., subtended by a pair of opposite leaves; leaflets oblong, stipules broad

1. *pratense*.

Flowers white or pinkish, in globose heads about .7 in. in diam., without leaves and long-stalked; leaflets obovate, emarginate, stipules narrow..... 2. *repens*.

Flowers yellow, in leafless stalked heads about .2 in. in diam.; leaflets very small, obcordate, stipules small 3. *dubium*.

1. *TRIFOLIUM PRATENSE*, Linn.; F. B. I. ii. 86.

Nilgiri Hills near the stations at 6,000–8,000 ft., introduced and run wild, “Red Clover.”

A perennial erect herb, a useful forage plant.

2. *TRIFOLIUM REPENS*, Linn.; F. B. I. ii. 86.

Nilgiri Hills, in pastures at high levels, introduced and run wild, “White or Dutch Clover.”

A perennial creeping herb, also a useful forage plant.

3. *TRIFOLIUM DUBIUM*, Sibth. *T. minus*, Sm.; F. B. I. ii. 86.

Nilgiri Hills, on roadside and waste lands on the plateau, introduced and run wild; N. Circars (Beddome).

An annual herb.

5. *Parochetus*, Hamilt.

A slender, creeping herb, rooting at the nodes. *Leaves* trifoliolate; stipules free or shortly adnate to the petiole. *Flowers*

rather large, on axillary peduncles, solitary or 2-3 in an umbel. *Calyx*-tube campanulate; teeth 5, subequal, the 2 upper connate nearly to the apex. *Corolla* blue or purplish-white, the petals free from the staminal tube, exserted; standard suborbicular, retuse, narrowed into a short claw; wings falcate-oblong with a narrow basal lobe; keel petals connected above, oblong-falcate, shorter than the wings, abruptly inflexed. *Stamens* diadelphous, the vexillary one free, filaments of the rest connate to near the top, anthers uniform. *Ovary* sessile, linear, multiovulate; style inflexed above; stigma terminal, small. *Pod* linear, turgid, obliquely acute, 2-valved. *Seeds* many, on filiform funicles.

PAROCHETUS COMMUNIS, Hamilt.; F. B. I. ii. 86. *P. major*, Don; W. & A. 252; Wt. Ic. t. 483.

Nilgiri and Pulney Hills at 6,000-8,000 ft.

A small pretty trailing and rooting herb with pale blue or purplish flowers, and clover-like leaves with obcordate leaflets.

6. Melilotus, Juss.

Annual or biennial herbs. *Leaves* pinnately 3-foliolate, the main nerves excurrent as marginal teeth; stipules adnate to the petiole. *Flowers* small, yellow or white, in slender axillary racemes; bracts and bracteoles minute or 0. *Calyx*-tube campanulate; teeth 5, subequal. *Petals* deciduous, free from the staminal tube; standard obovate or oblong, subsessile; wings oblong, longer than the obtuse keel. *Stamens* 10, vexillary filament free or connate in the middle with the others; filaments filiform; anthers uniform. *Ovary* sessile or stalked, with few ovules; style filiform, incurved; stigma terminal. *Pod* subglobose or oblong, indehiscent or tardily dehiscent; seeds 1 or few.

Corolla minute, yellow; pod usually 1-seeded; annual 1. *indica*.
Corolla rather larger, white; pod often 2-seeded; biennial ... 2. *alba*.

1. MELILOTUS INDICA, All. *M. parviflora*, Desf.; F. B. I. ii. 89; W. & A. 196.

Eastern Coast Districts, a cold-weather weed in fields.

2. MELILOTUS ALBA, Lamk.; F. B. I. ii. 89. *M. leucantha*, Koch; W. & A. 196.

Northern Districts, a cold-weather weed of cultivation.

Trigonella Foenum-Graecum, Linn., the Fenugreek, is an annual

herb cultivated occasionally, as a pot-herb and medicinal plant. *Medicago sativa*, Linn., the Lucerne, is occasionally cultivated as a fodder-crop.

7. *Cyamopsis*, DC.

Erect herbs with appressed laterally attached hairs. *Leaves* pinnately 3-foliolate (Indian species); leaflets toothed; stipules small, setaceous; stipels 0. *Flowers* in axillary racemes, small, purplish; bracts caducous; bracteoles 0. *Sepals* 5, connate in an oblique tube, lowest tooth longest, setaceous. *Petals* caducous; standard obovate; wings oblong, free; keel obtuse, subincurved, the petals connate above. *Stamens* monadelphous in a tubular sheath; anthers uniform, the connective apiculate. *Ovary* sessile, many-ovuled; style incurved at tip; stigma capitate. *Pod* linear, subquadrangular, acuminate, septate within. *Seeds* square, compressed, strophiole 0.

CYAMOPSIS TETRAGONOLOBA, Taub. *C. psoralioides*, DC; F. B. I. ii. 92; W. & A. 197; Wt. Ic. t. 248.

Eastern plains Districts, cultivated and occasionally found run wild. Cluster-bean.

A stout annual, 2-3 ft. high, with rather large leaflets and beaked pod. The pods are eaten as a vegetable, and the whole plant is cultivated for cattle-fodder. Vern. *Tam. Koth-averay*; *Tel. Goor chikurkai*.

8. *Indigofera*, Linn.

Herbs, undershrubs or shrubs, with appressed laterally attached hairs, sometimes mixed with basifixed hairs, frequently silvery-canescient. *Leaves* simple, trifoliolate or imparipinnate, the side leaflets usually opposite, but sometimes alternate, entire; stipules usually small, shortly adnate to the petiole; stipels setaceous or 0. *Flowers* generally very small, usually reddish or purple, in axillary racemes or spikes, rarely solitary, rarely paniced, each flower pedicelled in the axil of a caducous bract; bracteoles 0. *Calyx* minute, campanulate, teeth subequal or the lowest longest. *Corolla* more or less caducous; standard ovate or orbicular, sessile or slightly clawed; wings oblong, slightly adherent to the keel; keel petals erect, obtuse, with a downward spur on each side near the base. *Stamens* diadelphous, the vexillary stamen free, the others with connate filaments; anthers uniform, apiculate. *Ovary* sessile or subsessile, 1-2- or

many-ovulate; style glabrous; stigma capitate, sometimes pedicellate. *Pod* usually linear-cylindric, rarely oblong or globose, straight or curved, sometimes angled, sometimes muricate, often torulose, septate within between the seeds. *Seeds* globose or cylindric and truncate; strophiole 0.

Pod 1-seeded; leaves simple; annuals with very small flowers:—

Pod short, recurved, sickle-shaped, prickly on the broadened ventral suture; green plants nearly glabrous with broadly obovate obtuse leaves 1. *echinata*.

Pod very small, globose, smooth; silvery-hoary plants with linear to obovate leaves 2. *linifolia*.

Pod 2-many-seeded, linear or oblong or 4-angled; leaves simple or pinnate:—

Leaves simple, ovate-cordate, densely covered with long white soft hairs; flowers very small, the setaceous calyx-lobes longer than the corolla; pod minute, 2-seeded 3. *cordifolia*.

Leaves imparipinnate:—

Flowers solitary, pedicellate; pods slender, cylindric:—

Herbaceous perennial with slender prostrate reddish branches; leaflets usually 5, thin, oblanceolate, flat; pedicels filiform, '3-4 in. long; pod '4 in. long 4. *uniflora*.

Erect much-branched stiff undershrub, young branches silvery pubescent; leaflets usually 3, thick, oblanceolate, folded; pedicels slender, '2 in. long; pod '6 in. long ... 5. *aspalathoides*.

Flowers in axillary racemes:—

Racemes very short, subcapitate; pod oblong, 2-seeded:—

Leaves trifoliolate, leaflets up to 1 in. or more long, black-glandular beneath; pod pubescent, dentately winged on either side of the sutures, '2 in. long, sometimes 1-seeded

6. *glandulosa*.

Leaves 7-9-or more-foliolate, leaflets scarcely '5 in. long, not glandular, alternate; pod sparsely white-hirsute, not winged; '15 in. long 7. *enneaphylla*.

Racemes more or less elongate, not capitate; pod linear, flattened or cylindric, several-seeded:—

Leaves trifoliolate, the under-surface of the leaflets usually with round glands:—

Racemes slender, subcorymbose, up to 1 or 1'5 in. long, with pedicellate flowers; pods '6-8 in. long, not deflexed; leaflets apiculate, the glands large and prominent

8. *pedicellata*.

Racemes short with densely packed shortly pedicellate flowers; pods deflexed :—

Plants densely clothed with short spreading brownish hairs; pod cylindric, '3-4 in. long, '1 in. thick, not torulose; racemes short, scarcely up to 4 in. long

9. *vestita*.

Plants with sparse appressed brownish pubescence; racemes very short :—

Pods somewhat stout, '4-5 in. long, '1 in. thick, narrowly winged on both sides of the sutures, not torulose, about 4-6-seeded; leaflets oblanceolate emarginate, the end one almost or quite sessile

10. *trifoliata*.

Pods very slender, '6 in. long, under '05 in. thick, very faintly winged at the sides of the sutures, slightly torulose, about 8-seeded; leaflets obovate, obtuse or acute, apiculate, the end one very shortly petiolulate

11. *prostrata*.

Plants with white appressed pubescence; end leaflets petiolulate :—

Pods '5-6 in. long, brown, with appressed white pubescence, torulose, the sharp apex upcurved, seeds 2-4; leaflets membranous, obovate, mucronate, sparsely villous, glands prominent; racemes up to '4 in. long

12. *Barberi*.

Pods about 1 in. long, tetragonous, appressed grey-pubescent, not torulose, the sharp apex straight, seeds 6-10; leaflets thick, obovate, obtuse, much appressed pubescent, no glands; racemes up to 1 in. long, usually less, the upper flowers not fertile

13. *trita*.

Leaflets 1-4 rarely 5, alternate, densely covered, as the branches and inflorescence, with white appressed hairs; racemes many-flowered, elongate, up to 4 in. long; pods slender, deflexed and then curved upwards, torulose, 6-8-seeded

14. *oblongifolia*.

Leaflets 5, sometimes 7, thin, the side ones opposite; racemes slender, pods not torulose :—

Leaflets obovate, obtuse, '5 rarely '7 in. long, stipules lanceolate; racemes slender, 2-5-flowered, under 2 in. long; pods spreading, subcylindric, smooth, slender, '75 in. long, 10-12-seeded.....

15. *glabra*.

Leaflets elliptic obovate, usually acute, up to 1 in. or even

1·5 in. long; stipules subulate; racemes elongate; pods deflexed:—

Racemes up to 8 in. long or longer; pods linear, slender, subtetragonal, curved outwards, 2 in. long, 10-15-seeded

16. *subulata*.

Racemes up to 4 in. long; pods straight, cylindric or obscurely tetragonal, 1 in. long, 5-6-seeded

17. *marginulata*

Leaflets 7-13; flowers small, under ½ in. long:—

Side leaflets alternate, oblanceolate, up to 1 in. long, usually from 9 to 12; stipules lanceolate, scarious; racemes up to 4 in. long, many-flowered; pods ½-1 in. long, much deflexed, tetragonous, sharp-pointed, straight, 6-10-seeded

18. *endecaphylla*.

Side leaflets opposite:—

Racemes 3-6-flowered, short; leaflets small and narrow, stipules setaceous; pod flattened, margined, appressed pubescent, slightly torulose, ½ in. long, 10-12-seeded

19. *tenuifolia*.

Racemes 6-12-flowered:—

Densely pubescent with gland-tipped viscous hairs; leaflets small, elliptic-obovate with white appressed hairs as well as the glandular ones, stipules setaceous; pod cylindric, ½ in. long, mucronate, very hirsute

20. *viscosa*.

No gland-tipped hairs, only appressed white ones; leaflets up to 1 in. long, linear-oblong or -oblanceolate, often only 5, stipules minute; pod linear, compressed, pubescent, 1-1·5 in. long, curved at the tip; racemes very short 21. *parviflora*.

Racemes more than 12-flowered:—

Pods cylindric, more or less curved:—

Branchlets very silvery canescent; pods appressed silvery pubescent, ¼-½ in. long, 3-4-seeded, slightly torulose; leaflets 7-9, obovate, emarginate

22. *articulata*.

Branchlets glabrous, the youngest only slightly silvery canescent; pods green, ½-1 in. long, 6-12-seeded; leaflets 7-11, elliptic-obovate:—

Pods slender, under ½ in. thick, sharply pointed, slightly torulose, 10-12-seeded; racemes usually shorter than the leaves..... 23. *tinctoria*.

Pods stout, over .1 in. thick, obtuse at apex with a small mucro, slightly torulose, 8-10-seeded; racemes usually longer than the leaves

24. *sumatrana*.

Pods stout, .5-.75 in. long, about .1 in. thick, nearly straight, shortly mucronate, not torulose, about 6-seeded; racemes slender, up to 7 in. long

25. *longeracemosa*.

Pods more or less tetragonous:—

Pods straight, imbricately deflexed, densely clothed with soft spreading hairs, .5 to .75 in. long, seeds 6-8; racemes densely-flowered, 2-6 in. long, pedicels very short; leaflets rather large.....26. *hirsuta*.

Pods linear, curved, much constricted between the elongate joints, 1.5-2 in. or more long; slightly appressed silky; racemes slender, about 2 in. long, buds canescent; leaflets 7-11, elliptic oblong, slightly appressed-pubescent, up to 1 in. long

27. *constricta*.

Leaflets usually more than 13, occasionally less; flowers .3 in. long or longer:—

Flowers .3 in. long; stiff shrubs with appressed silvery pubescence; branches striated; leaflets elliptic-oblong or -obovate, emarginate or mucronate, coriaceous, .25-.75 in. long; pods straight, cylindric, acuminate, 1-1.5 in. long, grey-pubescent, 8-12-seeded 28. *Wightii*.

Flowers over .3 in. long; shrubs nearly glabrous, not silvery pubescent; pods glabrous:—

Pods up to 3 in. long, straight, prominently beaked; flowers .4-.5 in. long; leaflets elliptic-oblong, membranous, up to 1 in. long 29. *galegoides*.

Pods up to 2 in. long, straight, shortly beaked; flowers .4-.7 in. long; leaflets obovate-oblong, obtuse or emarginate, apiculate, subcoriaceous, up to 1 in. long 30. *pulchella*.

Flowers in paniced bracteate racemes, the bracts leaflet (1-3)-like, stipulate, the true leaves sessile with up to 10 pairs of opposite elliptic-oblong softly pubescent side leaflets, each .25-.5 in. long; pod cylindric, pubescent, .3-.5 in. long, 3-4-seeded

31. *mysorensis*.

1. INDIGOFERA ECHINATA, Willd.; F. B. I. ii. 92; W. & A. 198; Wt. Ic. t. 316.

N. Circars and Carnatic, along the East Coast.

A diffuse annual herb with pink flowers and prickly pod.

2. *INDIGOFERA LINIFOLIA*, Retz; F. B. I. ii. 92; W. & A. 198; Wt. Ic. t. 313; Roxb. Cor. Pl. ii. t. 195.

Circars, Deccan and Carnatic, common, often on black cotton soil; W. Coast, in S. Canara.

A prostrate annual branching from the ground and lying flat on it or only erect among grass. It has bright red flowers, a minute silvery pod, narrow leaves, and a somewhat 2-edged stem.

Var. *Campbellii*, Wt. Stem prominently 2-edged; leaves broader, obovate, mucronate.

Deccan Districts, Kistna to Cuddapah.

3. *INDIGOFERA CORDIFOLIA*, Heyne; F. B. I. ii. 93; W. & A. 199.

Deccan and Carnatic, on stony ground and black-cotton soil.

A prostrate silky annual with minute red flowers.

4. *INDIGOFERA UNIFLORA*, Buch.-Ham.; F. B. I. ii. 94; W. & A. 199; Wt. Ic. t. 333.

W. Coast from Malabar to Travancore; Coimbatore.

A very slenderly-branched prostrate plant with minute red flowers and cylindric pod.

5. *INDIGOFERA ASPALATHOIDES*, Vahl; F. B. I. ii. 94; W. & A. 199; Wt. Ic. t. 332.

E. Coast of the Carnatic from Nellore to Cape Comorin and Nagarcoil, on sandy lands; rarer inland.

A stiff silvery hoary undershrub with minute red flowers and straight cylindric pod.

6. *INDIGOFERA GLANDULOSA*, Willd.; F. B. I. ii. 94; W. & A. 199; Wt. Ic. t. 330.

Circars and Deccan from the Godavari to Salem, on wet lands, scarcer in Carnatic.

A stout undershrub with thick rootstock and long prostrate branches. Flowers red. Vern. *Tel.* Baragadam.

7. *INDIGOFERA ENNEAPHYLLA*, Linn.; F. B. I. ii. 94; W. & A. 199; Wt. Ic. t. 403.

Circars, Deccan and Carnatic, up to 3,000 ft. in hills, on pasture lands, common.

An undershrub with thick rootstock and prostrate branches. Flowers bright red. Vern. *Tel.* Cheragadam.

8. *INDIGOFERA PEDICELLATA*, W. & A. 200; F. B. I. ii. 95; Wt. Ic. t. 983.

W. Gháts, in the Nilgiri, Anamalai and Pulney Hills from 5,000 ft. upwards; Shevaroy Hills of Salem; in pasture lands and on roadsides.

An undershrub with thick rootstock and many slender branches, the flowers bright brick-red.

9. *INDIGOFERA VESTITA*, Baker in F. B. I. ii. 96.

W. Gháts, in the Nilgiri, N. Coimbatore, S. Malabar and Pulney Hills at 3,000 to 4,000 ft.

An undershrub with thick rootstock and very brown-hairy leaves and pods.

10. *INDIGOFERA TRIFOLIATA*, Linn.; F. B. I. ii. 96 *in part*; W. & A. 201 *in part*; Wt. Ic. t. 314.

Deccan, in Kurnool, Bellary and Mysore, up to 3,000 ft.; Anamalai Hills.

An undershrub with long trailing branches; flowers red.

Var. *multicaulis*, Gamble. *I. multicaulis*, DC. A larger plant with stiff erect branches and thicker, more numerous pods, nearly glabrous.

Deccan, in Mysore and Bellary, up to 3,000 ft.

11. *INDIGOFERA PROSTRATA*, Willd. *I. trifoliata*, Baker in F. B. I. ii. 96 *in part*; W. & A. 201 *in part*.

Deccan and Carnatic in hilly regions from the Kistna southwards; W. Coast and hills of the W. Gháts, rising to 3,000 ft., chiefly in grassy lands.

An undershrub with long very slender trailing branches, red flowers and almost filiform pods.

12. *INDIGOFERA BARBERI*, Gamble in Kew Bull. 1918,

Deccan and Carnatic from Cuddapah to S. Arcot and the Shevaroy Hills.

An erect canescent undershrub with slender branches.

13. *INDIGOFERA TRITA*, Linn. f.; F. B. I. ii. 96; W. & A. 203; Wt. Ic. t. 315, 386.

S. Circars, Deccan and Carnatic from the Godavari to Travancore, inland to Coimbatore and Madura, roadsides and waste places, common.

A stiff very grey undershrub up to 3 ft. high, with salmon-pink flowers and long tetragonous sharply-pointed pod.

Vern. *Tel.* Nakanaru.

14. INDIGOFERA OBLONGIFOLIA, Forsk. *I. paucifolia*, Del.; F. B. I. ii. 97; W. & A. 201; Wt. Ic. t. 331.
East Coast and Deccan, on the borders of fields in the plains country.
A stiff grey erect shrub reaching 6 ft. in height, with red flowers, and 1-5 usually 4 alternate leaflets variable in size.
15. INDIGOFERA GLABRA, Linn. *I. pentaphylla*, Linn.; F. B. I. ii. 95; W. & A. 200; Wt. Ic. t. 385.
Plains of the Circars, Deccan and Carnatic, also on the Travancore coast.
A small undershrub with many branches, flowers red.
16. INDIGOFERA SUBULATA, Vahl; F. B. I. ii. 96. *I. flaccida*, Koenig; W. & A. 204; Wt. Ic. t. 387.
Hills of the Kistna District; W. Ghâts, in the Anamalais, up to 3,000 ft.; Coimbatore and Salem Districts; growing among bushes.
A weak undershrub with long branches, subangular stems and red flowers.
17. INDIGOFERA MARGINULATA, Grah.; F. B. I. ii. 97; W. & A. 204.
E. slopes of the Nilgiris at 2,000 ft.; Dindigal Hills of Madura.
A weak undershrub, similar to the last except in pod.
18. INDIGOFERA ENDECAPHYLLA, Jacq.; F. B. I. ii. 98. *I. Kleinii*, W. & A. 204.
Hills of the Deccan, Nellore to Mysore; W. Ghâts, in Coimbatore and Nilgiris, up to 6,000 ft.
A trailing annual or biennial herb with purple flowers.
19. INDIGOFERA TENUIFOLIA, Rottl.; F. B. I. ii. 94; W. & A. 200.
Deccan, in Mysore and Bellary.
A small thin undershrub with small narrow leaflets and torulose pod.
20. INDIGOFERA VISCOSA, Lamk.; F. B. I. ii. 95; W. & A. 200; Wt. Ic. t. 404.
Circars, Deccan and Carnatic, from the Godavari to Madura, in sandy soils.
A small erect viscous pubescent shrub with many branches, flowers red.
21. INDIGOFERA PARVIFLORA, Heyne; F. B. I. ii. 97; W. & A. 201.

Deccan and Carnatic from Mysore to Madura and up to 3,000 ft., often in wet places.

A much-branched annual plant up to 2 ft. high with slender stems, long narrow leaflets and lilac flowers.

22. *INDIGOFERA ARTICULATA*, Gouan.; Prain and E. Baker in Journ. Bot. 1902, 141. *I. caerulea*, Roxb.: W. & A. 203; Wt. Ic. t. 365. *I. argentea* var. *caerulea*, Baker in F. B. I. ii. 99. Circars, Deccan and Carnatic, often on black cotton soil. Surat Indigo.

An erect shrub, up to 3 ft. high, flowers reddish-yellow, gives an indigo dye. Vern. *Tel.* Karunili.

23. *INDIGOFERA TINCTORIA*, Linn.; F. B. I. ii. 99 *in part*; W. & A. 202 *in part*; Wt. Ic. t. 365.

Circars, Deccan and Carnatic, also West Coast, cultivated and run wild. Madras Indigo.

A branching shrub, up to about 6 ft. high. Vern. *Hind.* Jinjini; *Tel.* Nili; *Tam.* Averi; *Kam.* Ajara; *Mal.* Amari.

24. *INDIGOFERA SUMATRANA*, Gaertn. *I. tinctoria*, F. B. I. ii. 99 *in part*; W. & A. 202 *in part, not of* Linn.

Circars and Deccan chiefly, occasionally elsewhere, cultivated and perhaps run wild. Bengal Indigo.

A twiggy shrub up to about 6 ft. high. Vern. *Hind.* Nil.

25. *INDIGOFERA LONGERACEMOSA*, Boivin; Prain and E. Baker in Journ. Bot. 1902, 144.

South Travancore (Beddome, Lawson, Barber).

A slender shrub with woody branches and leaves with rather small very thin leaflets.

26. *INDIGOFERA HIRSUTA*, Linn.; F. B. I. ii. 98; W. & A. 204. Almost all Districts, common.

An annual or biennial densely pubescent erect herb with pink flowers hidden by long subulate calyx lobes, rather large leaflets and conspicuous filiform stipules.

27. *INDIGOFERA CONSTRICTA*, Trimen. *I. flaccida* var. *constricta*, Thw.; F. B. I. ii. 99 *in note under I. tinctoria*.

Cochin, at Kavalay, 2,000 ft. (Meebold), but extends probably northwards to N. Kanara (coll. Talbot), though rare as in Ceylon.

An erect shrub, up to about 3 ft. high, with characteristic constricted pod and leaves like those of indigo, though with large leaflets.

28. *INDIGOFERA WIGHTII*, Grah.; F. B. I. ii. 99; W. & A. 202.
Madgol Hills of Vizagapatam, 4,500 ft. (A. W. Lushington);
Deccan Hills in Mysore, Coimbatore and Salem; W. Gháts,
up to 4,000 ft., in Nilgiris, Anamalais and Pulneys.
A stiff silvery shrub with small leaflets and yellowish-red
flowers.
29. *INDIGOFERA GALEGOIDES*, DC.; F. B. I. ii. 100.
W. Coast and W. Gháts, Malabar to Travancore, up to
2,000 ft.
A tall shrub with pale red flowers and very long-beaked
pods.
30. *INDIGOFERA PULCHELLA*, Roxb.; F. B. I. ii. 101; W. & A.
203; Wt. Ic. t. 367.
Hills of N. Circars, Deccan and W. Gháts, up to 5,000 ft.,
in dry forests.
A large shrub with handsome purple-red flowers, reaching
6 ft. in height. Vern. *Ur.* Girili; *Tel.* Siralli; *Tam.*
Narinci.
31. *INDIGOFERA MYSORENSIS*, Rottl.; F. B. I. ii. 102; W. & A.
202.
Hills of the Deccan in Chingleput and Mysore, up to
4,000 ft.; W. Gháts, on dry Nilgiri slopes, but scarce.
An erect much-branched, softly grey-pubescent shrub with
red flowers and small cylindric pods. The leafy bracts
make it appear as if the flowers were solitary in the leaf-
axils. Vern. *Tel.* Bapanga.

I found *Indigofera anabaptista*, Steud.; F. B. I. ii. 102 in the
Fort at Bellary. It had probably come from a seed casually
imported from Sind or Arabia.

9. *Psoralea*, Lind.

Herbs or undershrubs, punctate with black or pellucid glands.
Leaves unifoliate or imparipinnate, often dentate, stipulate.
Flowers capitate spicate subracemose or fascicled, rarely solitary,
in the axils of reduced floral leaves; bracts membranous, often
with 2-3 flowers each; bracteoles 0. *Calyx*-tube campanulate,
lobes subequal or the lowest the longest, the 2 upper often connate.
Corolla little exserted; standard ovate or orbicular, clawed;
wings oblong, falcate; keel petals obtuse, slightly connate.
Stamens diadelphous or the vexillary filament sometimes connate

with the rest; anthers small, uniform or slightly dimorphous. *Ovary* sessile or shortly stalked, 1-ovuled; style filiform or dilated at base; stigma terminal. *Pod* ovoid or oblong, 1-seeded, indehiscent, the pericarp usually adherent to the seed.

PSORALEA CORYLIFOLIA, Linn.; F. B. I. ii. 103; W. & A. 198.

Deccan and Carnatic, in most Districts, a weed of roadsides and waste places.

An erect annual, 1-3 ft. high, with blue flowers in dense long-peduncled heads and ovoid pitted pods. Leaves unifoliolate, broadly elliptic, dentate, petioled, covered with large black glands and a few white hairs. The seeds are used medicinally.

Vern. *Hind.* Babachi; *Tel.* Bapunga; *Tam.* Karporgam.

A South African shrub, *Psoralea pinnata*, Linn., has established itself about Ootacamund. It has blue flowers and very narrow leaflets.

10. *Mundulea*, DC.

Shrubs or small trees, usually silky-pubescent. *Leaves* imparipinnate, the leaflets reticulate and penninerved; stipules small. *Flowers* in terminal racemes, the pedicels fascicled; bracts small; bracteoles 0. *Calyx* campanulate, lobes short, the two upper often subconnate. *Corolla* much exserted; standard large, with 2 calluses at the base above the claw; wings falcate-oblong, long-clawed; keel petals incurved, obtuse at apex, clawed at base. *Stamens* monadelphous, the vexillary filament free only at base, alternate filaments slightly dilated above; anthers uniform. *Ovary* sessile; ovules many; style incurved, glabrous; stigma capitate. *Pod* large, linear, flat, subindehiscent, the sutures thickened. *Seeds* reniform, estrophiolate.

MUNDULEA SUBEROSA, Benth.; F. B. I. ii. 110. *Tephrosia suberosa*, DC.; W. & A. 210; Wt. Ill. t. 79.

Circars, Deccan and Carnatic, from Vizagapatam to Tinnevely, in dry forests on rocky hills and up to 4,000 ft.

A pretty little tree with thick corky yellow bark, close-grained yellow wood resembling satinwood, pink rather large flowers and silky shining leaves. Vern. *Tam.* Pilavaram.

11. *Tephrosia*, Pers.

Herbs or undershrubs, rarely shrubs. *Leaves* imparipinnate, sometimes reduced to one leaflet; side leaflets opposite, usually

numerous, all leaflets parallel-nerved, usually silky beneath; stipules free from the petiole, usually lanceolate or subulate, sometimes reduced to spines; stipels scarce or 0 or, in one case, almost spinous. *Flowers* reddish or white, in terminal or leaf-opposed racemes or solitary or in pairs in the axils of the leaves, bracteate; bracteoles 0. *Calyx*-tube campanulate, teeth subequal or the lower longer, the 2 upper often slightly connate. *Petals* clawed; standard suborbicular; wings obliquely oblong or obovate, slightly adherent to the incurved keel petals. *Stamens* diadelphous, the vexillary filament at first free below connate above, afterwards quite free; anthers uniform. *Ovary* sessile, linear, many-ovuled; style incurved, often flattened, glabrous or bearded; stigma terminal, often penicillate. *Pod* linear, flattened, continuous within or obscurely septate, dehiscing by both sutures. *Seeds* many, reniform elliptic or ovoid; strophiole usually 0, sometimes small, sometimes rather conspicuous.

ANALYSIS AND DESCRIPTIONS AFTER J. R. DRUMMOND.

Flower (including calyx) less than .125 in. long; claw of standard more than one-third as long as the limb; pod not more than 1 in. long; style in fruit deflexed.....1. *tenuis*.

Flower (including calyx) at least .125 in. long; claw of standard less than one-third as long as the limb; pod 1-3.5 in. long; style in fruit more or less recurved or ascending:—

Petiole angled and compressed, the angles and margins winged, the marginal wings excurrent as a pair of short stipellary spines; leaflet-margin indurated.....2. *calophylla*.

Petiole not compressed, its margins not winged; wings exstipellate; leaflet-margin not indurated:—

Calyx-teeth broadly deltoid, the anterior alone equalling or longer than the tube; pedicels in fruit manifestly articulate upon the axis:—

Pod more than 2.5 in. long; inflorescence not elongate:—

Terminal leaflet larger than the lateral ones which are about 1 in. long, white-silky beneath; stipules and bracts deltoid-lanceolate, deciduous; pod closely covered with short dull golden (when dry) tomentum; seeds oblong-reniform in outline, hardly compressed, .2 by .1 in., smooth; strophiole narrowly horseshoe-shaped, chalk-white.....3. *wynaadensis*.

Terminal leaflet about equalling the lateral, 1.5-2 in. long;

stipules and bracts subulate, persistent; pod clothed with coarse cottony villi, ashy-brown to grey; seeds lenticular, .16 by .125 in., margin bluntly keeled, strophiole dull brown, anvil-shaped.....4. *fusca*.

Pod less than 2.5 in. long, usually 1.5–2 in.; inflorescence elongate; stipules long filiform; leaflets 1–1.5 in. long

5. *noctiflora*.

Calyx-teeth narrowly deltoid or lanceolate below, cuspidate above, all equalling or exceeding the tube (at aestivation); pedicels not manifestly articulate upon the axis:—

Septa of pod manifest, persistent:—

Flowers very few, axillary; leaflets narrowly oblong-cuneate, terminal .5 in. or more long, upper surface pale green, lower cinereo-canescens; pod 1.5 in. long, .15 in. broad, falcate from above the middle, hairs on the valves closely appressed-canescens, on sutures ascending, fulvous; seed oblong-elliptic, .16 in. long, clay-coloured flecked with brown

6. *pentaphylla*.

Septa of pod evanescent or obscure:—

Pod entirely covered with dense villous tomentum, arcuately curving from the very base; flowers in fascicles on a long spiciform rhachis7. *hirta*.

Pod pilose or glabrescent, but never when mature covered with thick villous tomentum:—

Flowers in racemes (casually reduced to few in the axils or at the ends of branches):—

Racemes axillary; style bearded:—

Leaflets obovate-cuneate, terminal .75–1 in. by .125–.25 in., under-surface not silvery.....8. *maxima*.

Leaflets obovate, oblong or elliptical, base obtuse or (less frequently) bluntly cuneate, terminal .75–5 in. long, under-surface more or less silvery (casually glabrescent):—

Stipules broadly ovate-deltoid, .25 by .125 in., conspicuously carinate-striate, brown-scarious; bracts and bracteoles similar; leaflets with a distinct (but not indurated) margin; pod densely clothed with laxly appressed-silky fulvous hairs

9. *pulcherrima*.

Stipules linear-lanceolate, .25 by .04 in., obscurely striate, herbaceous; bracts and bracteoles subulate or almost setaceous; leaflets not marginate; pod

sparsely furnished with strigose cottony white hairs :—

Pod at least 2 in. long :—

Pod about 3 in. long ; standard .75 in. long
seeds mottled.....10. *canarensis*.

Pod under 2.5 in. long ; standard .35 in. or less ;
seeds not mottled :—

Stem and peduncles densely clothed, particularly on the angle, with ascending hairs ;
longest calyx-tooth about .125 in. long

11. *tinctoria*.

Stem and peduncles sparsely furnished with appressed hairs ; longest calyx-tooth about
.075 in. long12. *senticosa*.

Pod less than 2 in. long ; standard .4-.5 in. long

13. *Roxburghiana*.

Racemes extra-axillary ; style not bearded :—

Stem not procumbent ; racemes normally more than
3-flowered :—

Pod parchment-like or horny, normally more than
1 in. long :—

Leaflets lanceolate, normally acute 14. *lanceolata*.

Leaflets never truly lanceolate :—

Floral bracts not longer than the pedicels before aestivation, subulate ; pubescence of pedicel and calyx appressed :—

Stem ascending, subulate, glabrescent ; flowers
less than .3 in. long, bluish-purple

15. *purpurea*.

Stem erect, branches zigzag, angled, hairy ;
flowers more than .3 in. long, rose-coloured or scarlet16. *Hamiltonii*.

Floral bracts longer than the pedicels, setaceous ;
pubescence of calyx spreading...17. *Hookeriana*.

Pod papery, less than 1 in. long ; leaves less than
3 by 1.5 in. ; side leaflets 3-4 pairs, cuneate-obcordate.....18. *Barberi*.

Stems procumbent or (rarely) ascending ; racemes
1-3-flowered ; pod 9-12 (casually fewer-) seeded, valves
closely pilose, the hairs short, white, ascending ; seed
irregularly trapezoidal, the testa bony, aril obsolete

19. *procumbens*.

Flowers in axillary fascicles; stipules spinose; pod drepaniform, obscurely pubescent, up to 1·25 in. long; leaflets obovate-cuneate, terminal ·5 in. long or less....20. *spinosa*.

1. *TEPHROSIA TENUIS*, Wall.; F. B. I. ii. 111.

East Coast, in the Kistna District, in sandy places.

A slender caespitose plant with filiform stems and linear oblong membranous leaflet 1-2 in. long; flowers pink, on capillary pedicels.

2. *TEPHROSIA CALOPHYLLA*, Bedd. Ic. t. 166; F. B. I. ii. 111.

N. Coimbatore, on dry rocky hills above the Gazulhati Pass, at 3,000 ft. (Beddome).

A woody perennial with coriaceous strongly nerved leaflet 3-5 in. long, purplish-red flowers in elongate racemes and glabrous pod 2-3 in. long.

3. *TEPHROSIA WYNAADENSIS*, J. R. Drumm.

W. Ghâts, Tambracheri Ghât, Wynaad (Barber).

An erect undershrub, resembling *T. candida*, DC., end leaflets up to 1·5 in. long.

4. *TEPHROSIA FUSCA*, W. & A. 210; F. B. I. ii. 114.

Carnatic, Hills of Dindigal in Madura District (Wight).

Apparently a shrub and perhaps not indigenous. Though more woolly it resembles, like the preceding, the North Indian *T. candida*, DC. often cultivated in Madras Hill gardens.

5. *TEPHROSIA NOCTIFLORA*, Bojer. *T. Hookeriana*, Baker; F. B. I. ii. 113 *not of* W. & A.

Madras Presidency (?) (Walker).

An undershrub with golden-silky deflexed pods and narrowly oblong-ob lanceolate emarginate leaflets.

6. *TEPHROSIA PENTAPHYLLA*, Sweet. *T. senticosa*, Wt. Ic. t. 370. *Galega pentaphylla*, Roxb. Fl. Ind. iii. 384.

Deccan, in Bellary District, on black cotton soil (Wight).

A stout much branched undershrub, with very coriaceous stems and leaves.

7. *TEPHROSIA HIRTA*, Ham. *T. villosa*, W. & A. 212; F. B. I. ii. 113 *excl. some synonyms*. *T. argentea*, W. & A. 212 *excl. synonyms*. *T. incana*, W. & A. 212.

All plains Districts, on waste lands and by roadsides, ascending the hills to 3,000 ft.

An erect silky-villous undershrub with pale red flowers.

8. **TEPHROSIA MAXIMA**, Pers.; W. & A. 213; Trimen Fl. Ceyl. t. xxvii. *T. purpurea* var. *maxima*, Baker in F. B. I. ii. 113. Deccan and Carnatic, especially along the coast and on dry hills inland, to the south end of Travancore. A slender often prostrate undershrub with large pale pink flowers.
9. **TEPHROSIA PULCHERRIMA**, Wight ex Baker. *T. tinctoria*, Pers. var. *pulcherrima*, Baker in F. B. I. ii. 112. W. Gháts, in the Mysore, Malabar, Nilgiri, Anamalai and Travancore Hills, at about 3,000 ft. A pretty undershrub with pale red flowers and angular velvety branchlets and leaves, the end leaflet much the longest.
10. **TEPHROSIA CANARENSIS**, J. R. Drumm. *T. tinctoria*, Pers. var. *interrupta*, Baker in F. B. I. ii. 112 in part only. W. Gháts, in S. Canara, extending northwards, southwards to Wynaad. An erect undershrub with large reddish flowers and leaflets up to 2·5 in. long.
11. **TEPHROSIA TINCTORIA**, Pers.; F. B. I. ii. 111; W. & A. 211; Wt. Ic. t. 388. W. Gháts, common in all the region, chiefly between 3,000 and 7,000 ft.; extending eastwards to the Hills of Mysore, Coimbatore, Salem and even N. Arcot. A pretty undershrub with golden-brown pubescence, red flowers and leaflets variable in number from 1 to 13, the end one usually the longest.
12. **TEPHROSIA SENTICOSA**, Pers.; W. & A. 211 not of F. B. I. Deccan, Horsleykonda Hill in Cuddapah, at 4,500 ft. (Gamble); Kottayam in Travancore (Rangachari). A slender undershrub with narrow silvery leaves.
13. **TEPHROSIA ROXBURGHIANA**, J. R. Drumm. *T. tinctoria* var. γ . W. & A. 211. N. Circars, Mahendragiri Hill in Ganjam, 4,000 ft., Hills of Vizagapatam and Godavari; Deccan, Sandúr Hills of Bellary. A slender undershrub with usually a single leaflet, rarely more, the stems and under-surface of leaflets white-silky-pubescent.
14. **TEPHROSIA LANCEOLATA**, Grah. ex W. & A. 213. *T. purpurea*, Pers. var. β . W. & A. 213. *T. purpurea*, Pers.

F. B. I. ii. 112 *in part* (*Galega lanceaefolia*, Roxb. Fl. Ind. iii. 386).

N. Circars, on sandy lands near the coast, as far south as the Godavari.

An undershrub with bright purple flowers.

15. *TEPHROSIA PURPUREA*, Pers.; F. B. I. ii. 112 *in part*; W. & A. 213 *in part*.

In all plains Districts, on waste lands and by roadsides, very common.

An erect perennial undershrub with small red flowers. Said to give a blue dye resembling indigo. Vern. *Tam. Kat-kolingi*.

16. *TEPHROSIA HAMILTONII*, J. R. Drumm. *T. purpurea*, Pers.; F. B. I. ii. 212 *in part* (*Galega tinctoria*, Roxb. Fl. Ind. iii. 386 *not of* Linn.).

Deccan, in Northern and Western areas, on sandy soils (Wight 898).

A gregarious undershrub with large bright rose-coloured flowers.

17. *TEPHROSIA HOOKERIANA*, W. & A. 212; *not of* F. B. I.

W. Gháts, on dry soils at Sigúr, N. Nilgiris, at 3,000 ft. (Lawson, Gamble); Carnatic, at Trichinopoly (Wight).

A shrub with brownish silky stems and leaves and small flowers on short pedicels in elongated racemes.

18. *TEPHROSIA BARBERI*, J. R. Drumm.

S. Carnatic at Kudiramalai Teri, Tinnevely (Barber); Tuticorin (Wight).

A distinct-looking undershrub with reddish flexuose branchlets and small obovate obtuse leaflets, softly villous.

19. *TEPHROSIA PROCUMBENS*, Ham. *T. purpurea* var. *pumila*, Baker in F. B. I. ii. 113. *T. diffusa*, W. & A. 213.

Circars, Deccan and Carnatic, on waste lands in open forest and among grass in pastures, up to 3,000 ft. in the hills.

A slender herbaceous perennial with white flowers.

20. *TEPHROSIA SPINOSA*, Pers.; F. B. I. ii. 112; W. & A. 214 *excl. cert. syn.*; Wt. Ic. t. 372.

Carnatic, from the Kistna southwards, on dry barren lands on the coast and inland to the Hills of Coimbatore, Madura and Tinnevely.

A stiff thorny grey-canescant low shrub.

12. *Millettia*, W. & A.

Trees or large shrubs, usually climbing. *Leaves* imparipinnate, stipulate, the side leaflets opposite, usually stipellate, penninerved. *Flowers* rather large, showy, fascicled, rarely scattered, on the rhachis of axillary or terminal racemes or panicles; bracts and bracteoles usually small, caducous. *Calyx* campanulate, the teeth short. *Corolla* much exserted; standard ovate or orbicular, emarginate, spreading or reflexed, glabrous or silky on the back; wings obliquely oblong, clawed; petals of keel incurved, obtuse, clawed. *Stamens* monadelphous, sometimes diadelphous by the vexillary filament being quite free; anthers uniform, ovate. *Ovary* sessile or rarely stalked, few-ovuled; style inflexed, glabrous; stigma capitate. *Pod* linear or oblong or oblanceolate, flat or turgid, coriaceous or woody, late in dehiscing. *Seeds* few, orbicular or reniform, estrophiolate.

Standard not auricled at the base:—

Leaves very silky-pubescent beneath, especially when young; stamens monadelphous; pods velvety, the endocarp not separable:—

Pubescence very shining, silvery; leaflets 7-9, oblanceolate, obtuse at apex, main nerves 15-25 pairs; calyx distinctly toothed; pods flattened, 3-4 in. long, .75 in. broad...1. *splendens*.

Pubescence ferruginous; leaflets 5-7, obovate, acute at apex, main nerves 8-10 pairs; calyx-teeth very indistinct; pods thick, oblong or trapezoid, turgid, 2-4 in. long, 1-1.5 in. broad

2. *rubiginosa*.

Leaves not silky, merely slightly pubescent; leaflets 11-15, obovate, obtuse; calyx-teeth short; stamens diadelphous; pods glabrous, linear, torulose, the endocarp separable, 4-10 in. long, .5 in. broad

3. *racemosa*.

Standard auricled at the base; leaflets 7-9 pairs, obovate, obtuse; calyx shortly toothed; stamens monadelphous; pod linear, flattened, velvety, 6-9 in. long, 1 in. broad, the sutures thickened

4. *auriculata*.

1. *MILLETTIA SPLENDENS*, W. & A. 263; F. B. I. ii. 104; Bedd. Ic. t. 295.

W. Gháts, in the Nilgiri and Anamalai Hills, up to 4,000 ft. A large, very handsome climbing shrub with reddish flowers.

2. *MILLETTIA RUBIGINOSA*, W. & A. 263; F. B. I. ii. 104; Wt. Ic. t. 207.

W. Ghâts, in the forests of Tinnevely and Travancore, up to 5,000 ft.

A large climbing shrub with reddish flowers.

3. *MILLETTIA RACEMOSA*, Benth.; F. B. I. ii. 105. *Tephrosia racemosa*, W. & A. 210.

N. Circars and Deccan, in dry hill forests at low levels, from Ganjam to Bellary and Coimbatore.

A large climbing shrub with thick brown rough bark, large leaves, torulose pods and whitish flowers. Vern. Tel. Galuga.

4. *MILLETTIA AURICULATA*, Baker; F. B. I. ii. 108.

Forests of Ganjam and Vizagapatam, chiefly with Sál, up to 4,000 ft.

A large climber with light brown bark and wood in alternate layers of soft woody and bast tissue. It is sometimes found as a nearly erect shrub. Flowers whitish. The bark gives a rough fibre. Vern. Hind. Ganj; Ur. Rekorlo.

13. *Sesbania*, Scop.

Herbs, shrubs or small soft-wooded trees, often prickly. *Leaves* abruptly pinnate, long, narrow; leaflets numerous, linear-oblong, mucronate, deciduous; stipules lanceolate or setaceous, deciduous. *Flowers* in lax axillary racemes; bracts and bracteoles setaceous, usually early deciduous. *Calyx* campanulate, with 5 short equal teeth. *Corolla* much exserted, the petals all with long claws; standard orbicular or ovate, spreading or reflexed; wings falcate-oblong; keel petals obtuse or subrostrate. *Stamens* diadelphous; anthers uniform. *Ovary* linear, usually stipitate, many-ovuled; style incurved, glabrous; stigma capitate. *Pod* long, linear, narrow, flattened or 4-angled, septate within between the seeds. *Seeds* transversely oblong, strophiole 0.

Flowers under .75 in. long, buds straight:—

Stems without prickles; standard with 2 appendages at the base which run as keels into the claw; pods twisted, pendulous:

Flowers usually .5–.6 in. long, standard appendages long-tailed; pods torulose, 6–9 in. long 1. *aegyptiaca*.

Flowers usually .75–1 in. long, standard appendages triangular; pods slightly torulose, 10–12 in. long 2. *paludosa*.

Stems and leaf-rhachises prickly; standard without appendages:—

Flowers 4-5 in. long; pod straight, erect, 8-12 in. long, 1 in. broad, slightly torulose.....3. *aculeata*.

Flowers 25 in. long or less; pod straight, erect, 2-4 in. long, much torulose 4. *procumbens*.

Flowers 3 in. long; buds falcately recurved; pods 1 ft. or more long, 3 in. broad, falcate, not torulose, the sutures much thickened

5. *grandiflora*.

1. *SESBANIA AEGYPTIACA*, Pers.; F. B. I. ii. 114; W. & A. 214; Wt. Ic. t. 32.

Cultivated or found run wild in almost all plains Districts.

A soft wooded shrub with yellow flowers, the standard usually purple or purple-spotted. It is used to make hedges and the wood gives a good charcoal for gunpowder.

Vern. *Hind.* Jait; *Tel.* Suiminta; *Tam.* Chittakatti.

2. *SESBANIA PALUDOSA*, Prain. *S. aculeata* var. *paludosa*, Bak. in F. B. I. ii. 115, excl. syn. *Aeschynomene uliginosa*, Roxb.

Marshy places on W. Coast, Travancore (M. Rama Row).

An annual shrub with pith-like stems and yellow flowers.

Vern. *Hind.* Kathsola.

3. *SESBANIA ACULEATA*, Poir.; F. B. I. ii. 114; W. & A. 214.

Wet places in plains Districts, chiefly in the Carnatic, extending to the hills.

A soft-wooded prickly shrub with long leaves, and very many small leaflets and pale yellow flowers.

4. *SESBANIA PROCUMBENS*, W. & A. 215; F. B. I. ii. 115.

Coast Districts on the East side, chiefly in rice-fields, but scarce.

A diffuse prickly annual herb.

5. *SESBANIA GRANDIFLORA*, Pers.; F. B. I. ii. 115. *Agati grandiflora*, Desv.; W. & A. 215.

Cultivated in gardens or betel-vine plantations, not indigenous.

A small soft-wooded tree reaching 20-30 ft. high, with large showy red or white flowers and long pods. The wood is sometimes used for posts, and the young leaves, flowers and pods eaten as a vegetable. Vern. *Hind.* Basna; *Tel.* Avesi; *Tam.* Agati.

14. *Geissaspis*, W. & A.

Slender diffuse annual herbs. *Leaves* abruptly pinnate; leaflets 2 pairs, obovate; stipules membranous, produced below the insertion; stipels 0. *Flowers* very small, yellow or purplish, in long-peduncled axillary racemes; bracts large, oblique, veined, imbricate, persistent, more or less concealing the flowers and fruit. *Calyx* deeply 2-lipped, the upper entire, the lower obscurely 3-toothed. *Corolla* longer than the calyx; standard suborbicular, shortly clawed; wings oblong or obovate; keel petals incurved, obtuse, slightly united at the back. *Stamens* monadelphous, the filaments free in the upper third; anthers uniform. *Ovary* shortly stalked; ovules 2; style incurved; stigma minute, terminal. *Pods* 1-2-jointed, the joints turgid in the middle at first with a flat border, reticulately veined, indehiscent. *Seeds* subreniform.

Flowers much shorter than the bracts; bracts orbicular, the margins with many long stiff brown hairs, the bases long-sagittate; stipules lanceolate, long-spurred, long-ciliate, persistent; corolla purplish; leaflets 4-5 in. long 1. *cristata*.

Flowers as long as or longer than the bracts; bracts ovate, mucronate-dentate, the bases shortly sagittate; stipules oblanceolate, shortly spurred, spinous-ciliate, deciduous; corolla yellow; leaflets 2-3 in. long 2. *tenella*.

1. *GEISSASPIS CRISTATA*, W. & A. 218; F. B. I. ii. 141; Bedd. Ic. t. 293.

W. Coast, from S. Canara to Travancore; W. Gháts, in Mysore, lower Nilgiris and Malabar, up to 3,000 ft., usually in rice-fields.

A very pretty plant, conspicuous for its beautiful long-ciliate imbricate bracts.

2. *GEISSASPIS TENELLA*, Benth.; F. B. I. ii. 141.

W. Coast, plains of S. Canara, in rice-fields.

A much smaller plant than the preceding, the bracts only mucronate-dentate.

15. *Zornia*, Gmel.

Herbs. *Leaves* digitately 2-4-foliate; leaflets gland-dotted; stipules subfoliaceous, gland-dotted, usually peltate; stipels 0. *Flowers* in interrupted spikes or solitary, on terminal or axillary

peduncles; bracts geminate, stipular, foliaceous, each pair enclosing a sessile flower; bracteoles 0. *Calyx* small, membranous or hyaline, the 2 upper lobes connate in a lip, the 2 lateral small, the lowest as long as the upper. *Corolla* exserted, the petals clawed; standard suborbicular; wings obliquely oblong; keel petals incurved, acute. *Stamens* monadelphous in a closed tube, the free part of filaments about one-third of their length; anthers dimorphous. *Ovary* sessile; ovules many; style filiform; stigma minute, terminal. *Pod* a compressed lomentum of several, smooth or with glochidiate prickles, 1-seeded joints. *Seeds* subreniform, estrophiolate.

Leaflets usually lanceolate acuminate, glabrous, rarely ovate, up to 1 in. long, dotted with scattered black glands; standard cordate above the claw; joints of lomentum 1 in. in diam., the prickles retrorsely scabrous.....1. *diphylla*.
Leaves ovate mucronate, up to 6 in. long, glabrous or more or less white-villous, dotted with many minute white glands; standard narrowed above the claw; joints of lomentum 2 in. in diam., the prickles glabrous 2. *zeylonensis*.

1. ZORNIA DIPHYLLA, Pers.; F. B. I. ii. 147. *Z. angustifolia*, Sm.; W. & A. 217.

All dry Districts especially near the coast; inland up to 3,500 ft., often on rocks.

A diffuse wiry herb with yellow flowers. Leaves usually lanceolate, but those near the base are often ovate and even emarginate. The bracts and stipules are very characteristic.

2. ZORNIA ZEYLONENSIS, Pers.; W. & A. 217. *Z. diphylla* var. *zeylonensis*, Baker; F. B. I. ii. 118.

East Coast Districts from Ganjam to Travancore, in sandy places near the sea.

A diffuse herb with longer branches and stouter rootstock than the former.

16. *Stylosanthes*, Swartz.

Stiff undershrubs. *Leaves* pinnately trifoliolate; stipules large, adnate to the base of the petiole; stipels 0. *Flowers* small, usually yellow, in dense terminal heads, imbricate with the leaf-stipules and linear lanceolate scarious bracts. *Calyx*-tube very

long, slender, filiform; lobes obtuse, membranous, ciliate, unequal, the upper 4 connate. *Petals* inserted at the throat of the calyx-tube; standard orbicular; wings oblong, free; keel petals incurved, obtuse. *Stamens* monadelphous; anthers dimorphous. *Ovary* subsessile at the base of the calyx-tube; ovules 2-3; style elongate, filiform; stigma minute, terminal. *Pod* sessile, compressed, hooked at the apex with the persistent base of the style; joints 1-2, reticulate or muricate. *Seeds* compressed, lenticular, estrophiolate.

STYLOSANTHES MUCRONATA, Willd.; F. B. I. ii. 148; W. & A. 218; Bedd. Ic. t. 294.

N. Circars, Deccan and Carnatic, in dry localities, up to 3,000 ft. in the hills.

A stiff undershrub with trifoliolate sharply mucronate leaves and conspicuous sheathing stipules, the pods small, hard, reticulate, flowers yellow. Vern. *Tel.* Saille kumpa.

Arachis hypogaea, Willd. is the "Ground nut" or "Monkey nut," largely cultivated for its edible seed, from which a valuable oil is expressed. It is an article of considerable trade.

17. *Lespedeza*, Michx.

Herbs or shrubs. *Leaves* pinnately 3- rarely 1-foliolate; leaflets entire without stipels; stipules free, small. *Flowers* purple pink white or yellow, in axillary fascicles or racemes or terminal panicles; bracts small; bracteoles 2 at the base of the calyx-tube. *Calyx*-tube campanulate, teeth 5 subequal or the 2 upper slightly connate, lanceolate or linear. *Corolla* exserted; standard obovate, narrowed to a claw; wings falcate; keel petals incurved, obtuse or beaked. *Stamens* diadelphous, 9 and 1; anthers uniform. *Ovary* sessile or stalked, 1-ovuled; style filiform, incurved; stigma capitate. *Pod* small, orbicular or ovate, compressed, 1-seeded, flattened, indehiscent. *Seeds* suborbicular, strophiole 0.

LESPEDEZA SERICEA, Miq.; F. B. I. ii. 142.

W. Gháts, in the Pulney Hills, at 6,000-7,000 ft. (Bourne, Fischer).

An erect undershrub with long slender virgate branches, small white flowers tinged with purple, linear cuneate silky leaflets and very small orbicular pod.

18. *Taverniera*, DC.

Much-branched undershrubs. *Leaves* 1- or pinnately 3-foliate; leaflets usually obovate or orbicular; stipules scarious, sheathing, opposite the leaves. *Flowers* white or rose, in lax axillary racemes; bracts minute, deciduous; bracteoles 2, at the base of the calyx. *Calyx*-tube campanulate, teeth 5, subbilabiate, subequal. *Corolla* much exserted, scarious and persistent; standard obovate, shortly clawed; wings oblong, much smaller than the standard; keel petals about equal to the standard, obliquely truncate at apex, clawed. *Stamens* diadelphous, 9 and 1; the vexillary one connate with the others at the middle at first, afterwards free; anthers uniform. *Ovary* stalked, 1-2-ovuled; style filiform, inflexed; stigma small, terminal. *Pod* flattened, compressed, of 1-3 joints usually echinate and transversely ridged.

TAVERNIERA CUNEIFOLIA, Arn. in Wt. Ic. t. 1055. *T. nummularia*, Baker in F. B. I. ii. 140 not of DC.

Deccan, in Kurnool and Bellary (Beddome).

A much-branched undershrub with terete hoary branches, 3- or 1-foliate leaves, persistent scarious corolla and glabrous echinate 1-2-jointed pod.

19. *Smithia*, Ait.

Herbs or undershrubs. *Leaves* paripinnate, rarely imparipinnate, the rhachis usually ending in a bristle; leaflets small, sensitive, without stipels; stipules scarious, persistent, usually produced below the insertion (in Asiatic species). *Flowers* yellow or blue, in axillary often unilateral racemes, sometimes collected in terminal heads or panicles; bracts and bracteoles scarious or membranous, persistent. *Calyx* deeply 2-lipped, the upper entire or emarginate, the lower entire or 3-toothed. *Corolla* exserted; standard suborbicular, cuneate at base; wings obliquely oblong, clawed and auricled; keel petals obtuse, incurved, clawed. *Stamens* diadelphous in 2 bundles of 5 each; anthers uniform. *Ovary* sessile or stalked, many-ovuled; style filiform; stigma small, terminal. *Fruit* a lomentum of flattened or turgid 1-seeded orbicular joints, folded together inside the calyx. *Seeds* reniform, strophiole 0.

Calyx rigid, with close parallel simple veins; flowers yellow:—

Stems not bristly; calyx-lips equal, acute:—

Lomentum joints papillose:—

Flowers in short racemes; lower calyx-lip with a few scattered bristles; leaflets 3-10 pairs, each .2-.4 in. long, bristly only on margins and midrib beneath ... 1. *sensitiva*.

Flowers in pairs or single from the leaf-axils; lower calyx-lip with a tuft of bristles near the apex; leaflets 4-7 pairs, each .3-.6 in. long, very bristly on margins and midrib with smaller ones between.....2. *geminiflora*.

Lomentum joints smooth; flowers in pairs in the axils of leaves crowded at the ends of the branches; lower calyx-lip bristly along the keel at the back; leaflets 4-7 pairs, .2-.4 in. long, very bristly all over on the back.....3. *conferta*.

Stems conspicuously bristly; calyx-lips obtuse, the upper much the longer, both very yellow-bristly; flowers in terminal panicles of racemes; leaflets glabrous with few bristles, 4-12 pairs, 1-1.5 in. long; lomentum joints reticulate.....4. *setulosa*.

Calyx membranous, with anastomosing veins:—

Flowers yellow:—

Flowers in loose racemes with filiform peduncles and pedicels:—

Leaflets usually 2 pairs; calyx-lips equal, the upper truncate, the lower 3-lobed; lomentum joints reticulate and papillose, very small, under .1 in. in diam.5. *bigemina*.

Leaflets 3 pairs; calyx-lips equal in length, the upper broad with 3 parallel nerves in the middle, the lower acute scarcely lobed; lomentum joints reticulate with flat margins, .1 in. in diam. or more6. *gracilis*.

Flowers in close more or less corymbose racemes with short pedicels, lomenta with 4-7 reticulate joints; leaflets 3-4 pairs:—

Calyx-lips bristly and ciliate with yellow hairs not on black bases, upper lip truncate, retuse, lower smaller, obscurely 3-lobed; racemes short7. *racemosa*.

Calyx-lips with conspicuous bristles on black bulbous bases, upper lip truncate, emarginate, lower smaller, acute, obscurely 3-lobed; racemes elongate, one-sided.....8. *hirsuta*.

Flowers in subcapitate heads on peduncles 1-1.5 in. long, in pairs or threes in the upper leaf axils; leaflets 4 pairs, up to 1 in. long by .3 in. broad; lomentum with 3-6 reticulate bordered joints; calyx-lips merely short-ciliate on the edges, upper lip broad, emarginate, lower 3-lobed9. *Venkobarrowii*.

Flowers in terminal panicles of corymbose racemes one-sided in

fruit; leaflets 4-5 pairs, often very bristly like the stems; calyx-lips obtuse, upper emarginate, lower 3-lobed, softly yellow-bristly; lomentum joints reticulate, bordered10. *blanda*. Flowers in dichotomously branched lax few-flowered corymbose panicles; leaflets 2-4 pairs, glabrous, with very few bristles; calyx-lips accrescent in fruit, the lower the longer, ciliate and with very few bristles; lomentum joints margined on one side papillose.....11. *salsuginea*. Flowers blue or purplish, in terminal spherical heads, very numerous; leaflets 9-15 pair, ciliate on the margins and midrib, bristly on the rhachis; calyx-lips broadly obovate, obtuse, long-bristly toothed on the margins; bracteoles long; lomentum joints smooth12. *capitata*.

1. *SMITHIA SENSITIVA*, Ait.; F.B. I. ii. 148; W. & A. 220 *in part*, var. *α*.

W. Coast, in S. Canara (Hohenacker); W. Ghâts, in the Anamalai Hills (Wight).

A diffuse weed with somewhat woody stems, "bi- or triennial (Roxb.)."

2. *SMITHIA GEMINIFLORA*, Roth; F. B. I. ii. 149; W. & A. 220 *in part*, var. *β*.

W. Coast and W. Ghâts, from S. Canara southwards, eastwards to Mysore and Coimbatore Hills, up to 4,500 ft.

An erect herbaceous plant of grassy places and open forest undergrowth.

3. *SMITHIA CONFERTA*, Sm. *S. geminiflora* var. *conferta*, Baker in F. B. I. ii. 149.

N. Circars, Hills of Ganjam, up to 4,500 ft. on Mahendragiri; W. Coast and W. Ghâts, from S. Canara to Travancore, eastwards to Mysore and Coimbatore, up to 4,000 ft.

A much branched herbaceous undershrub of open forest undergrowth.

4. *SMITHIA SETULOSA*, Dalz.; F. B. I. ii. 149; Bedd. Ic. t. 243.

W. Coast and W. Ghâts, in S. Canara, Mysore and Wynaad, up to 3,000 ft.

A tall annual herb up to 4 ft. high.

5. *SMITHIA BIGEMINA*, Dalz.; F. B. I. ii. 149.

W. Ghâts, eastern side, in Mysore at 3,500 ft. (Meebold).

A much branched annual with very slender wiry stems.

6. *SMITHIA GRACILIS*, Benth.; F. B. I. ii. 150.
 W. Gháts, in the Nilgiri and Pulney Hills at 5,000 to 7,000 ft. on grassy slopes.
 A diffuse slender herbaceous plant.
7. *SMITHIA RACEMOSA*, Heyne; W. & A. 221. *S. blanda* var. *racemosa*, Bak. in F. B. I. ii. 151 *in part*.
 W. Gháts, Bababudan Hills of Mysore (Talbot), Anamalai Hills of Coimbatore at 3,000 to 4,000 ft. (Beddome, Fischer).
 A small diffuse herbaceous plant.
8. *SMITHIA HIRSUTA*, Dalz. *S. blanda* var. *racemosa*, Baker in F. B. I. ii. 151 *in part*. *S. blanda* var. *humilis*, Prain in Journ. As. Soc. Beng. LXVI. 66.
 W. Gháts, in Wynaad, Nilgiri, Anamalai and Pulney Hills, at 3,000 to 7,000 ft. in wet places; Hills of Vizagapatam in E. Gháts 3,500 to 5,000 ft. (?).
 An erect diffuse plant with rather few branches.
9. *SMITHIA VENKOBAROWII*, Gamble in Kew Bull. 1918, ined. Travancore Hills, at Peermade (K. Venkoba Row.).
 A trailing herb with rather large bright orange-yellow flowers.
10. *SMITHIA BLANDA*, Wall.; W. & A. 221; F. B. I. ii. 151; Wt. Ic. t. 986 except fig. 6 (*S. hirsuta* ?).
 W. Gháts, in the Mysore, Nilgiri, Anamalai, Travancore and Cochin Hills, at 4,000 to 6,000 ft.
 A tall almost shrubby plant reaching 2 ft. or more in height and conspicuous for its bright yellow rather large flowers.
11. *SMITHIA SALSUGINEA*, Hance. *S. dichotoma*, Dalz.; F. B. I. ii. 150.
 W. Coast, in S. Canara (Hohenacker, K. Rungachari).
 An erect annual with reddish branches. The calyx-lips are about equal in fruit, in flower the lower is the longer.
12. *SMITHIA CAPITATA*, Dalz.; F. B. I. ii. 150; Bedd. Ic. t. 244.
 W. Gháts, in the Hills of Mysore, S.-E. Wynaad, the Bolampatti valley and the Anamalais, at 2,000–3,000 ft., in open grass lands.
 A pretty branching annual at once recognised by the bluish flowers and capitate heads.

20. *Aeschynomene*, L.

Erect herbs, undershrubs or shrubs. *Leaves* imparipinnate with very numerous close sensitive linear leaflets; stipules setaceous or lanceolate; stipels 0. *Flowers* yellow, often purple-striate, in axillary rarely-terminal racemes; bracts stipuliform; bracteoles 2 at the base of the calyx. *Calyx* deeply 2-lipped, the upper lip entire or bifid the lower entire or trifid, sometimes the lobes subequal. *Corolla* exsert; standard orbicular; wings obliquely obovate, equal to or shorter than the standard, transversely barred; keel petals oblong or falcate, obtuse or acute. *Stamens* diadelphous, in 2 bundles of 5 each; anthers uniform. *Ovary* stipitate, 2-many-ovuled; style filiform, incurved; stigma terminal. *Pod* a long-stipitate lomentum with 2-10 flattened 1-seeded easily separating joints. *Seeds* subreniform, estrophiolate.

Stems slender, woody; flowers small, the calyx membranous, glabrous; upper suture of the pod straight, up to 1·5 in. long, joints about 15 in. in diam., smooth or papillose on the faces 1. *indica*.
 Stems stout, pith-like; flowers large, the calyx 4 in. long, hispid; upper suture of the pod indented almost as the lower, up to 2·5 in. long, joints 4 in. long by 3 in. broad, echinulate opposite the seeds

2. *aspera*.

1. *AESCHYNOMENE INDICA*, Linn.; F. B. I. ii. 151; W. & A. 219; Wt. Ic. t. 405.

In most Districts, in wet pasture land near water, up to 3,000 ft. in hilly country.

A slender undershrub with numerous minute leaflets and viscid inflorescence. Vern. *Tel.* Tiga jeluga.

2. *AESCHYNOMENE ASPERA*, Linn.; F. B. I. ii. 152; W. & A. 219; Wt. Ic. t. 299.

Borders of ponds and tanks in the Deccan and Carnatic, not very common.

A tall soft perennial shrub reaching 10 ft. in height, the stems easily floating. They are used for making sun hats, fishing floats, toys, and for many other purposes. Vern. *Hind.* Sola; *Tel.* Nir jiluza; *Tam.* Attuneddi.

21. *Ormocarpum*, Beauv.

Shrubs. *Leaves* imparipinnate or 1-foliolate; leaflets alternate, exstipellate; stipules small, striate. *Flowers* in short few-flowered

axillary racemes; bracts small, scarious; bracteoles 2, at the base of the calyx-tube. *Calyx*-tube campanulate; lobes 5, the 2 upper subconnate broad, the median ones similar, the lowest longer and narrow. *Corolla* exserted, petals all clawed; standard orbicular, short; wings obliquely obovate; keel petals incurved, usually obtuse, equal to the wings. *Stamens* at first monadelphous, the tube cleft above, later on in two bundles of 5 each; anthers uniform. *Ovary* linear, few-ovuled; style filiform; stigma minute, terminal. *Pod* stalked, compressed, striate longitudinally and prickly-warted, the joints oblong, narrow at both ends. *Seeds* narrowly oblong.

ORMOCARPUM SENNOIDES, DC.; F. B. I. ii. 152; W. & A. 216; Wt. Ic. t. 297.

Deccan, in Cuddapah, N. Arcot and Chingleput, in woods and hedges and on waste lands, scarce.

A low shrub with oblong obtuse membranous leaflets, yellow flowers, and prickly pods with 2-4 distant joints. Vern. *Tel.* Nal kashina.

22. *Leptodesmia*, Benth. & Hook. f.

Diffuse perennial herbs. *Leaves* 1- or 3-foliolate; leaflets small, stipellate; stipules free. *Flowers* small, crowded in short terminal capitate racemes; bracts scariose, imbricate, deciduous. *Calyx* of 5 subequal setaceous lobes. *Corolla* small, included; standard suborbicular, clawed; wings obliquely oblong; keel-lobes obtuse. *Stamens* diadelphous, 9 and 1; anthers uniform. *Ovary* sessile, 1-ovuled; style filiform, incurved; stigma capitate. *Pod* small, membranous, 1-seeded, included in the calyx, the valves opening widely. *Seed* estrophiolate.

LEPTODESMIA CONGESTA, Benth.; F. B. I. ii. 152. *Nicolsonia congesta*, Wt. Ic. t. 1056.

W. Gháts, in the Nilgiri and Pulney Hills, at 4,000 to 7,000 ft.

A small trailing perennial with orbicular or orbicular-oblong leaves up to 75 in. long, small reticulate pods and crowded capitate flower-heads yellow or white plumose with the long hairs on the setaceous sepals.

23. *Eleiotis*, DC.

Annual procumbent slender herbs with triquetrous stems. *Leaves* 1-3-foliolate; leaflets stipellate; stipules striate. *Flowers*

single or in pairs, distant, in slender axillary racemes; bracts large, scarious, striate, deciduous; bracteoles minute or 0. *Calyx*-tube campanulate, 5-toothed. *Corolla* exserted; standard obovate, emarginate; wings oblong; keel petals obtuse. *Stamens* diadelphous, 9 and 1, persistent; anthers uniform. *Ovary* subsessile, 1-2-ovuled; style short, inflexed above; stigma capitate. *Pod* a single, boat-shaped, membranous, reticulate, compressed joint, the dorsal margin straight. *Seed* transversely oblong, subreniform; strophiole 0.

ELEIOTIS SORORIA, DC.; F. B. I. ii. 153; W. & A. 231.

Deccan and Carnatic, westwards to the Shevaroy Hills and the lower E. slopes of the Nilgiris and Pulneys.

A long-trailing plant with usually a single leaflet about .5 in. long and .75 in. broad, emarginate at apex, cordate at base, sometimes with a pair of small leaflets above the petiole; very small flowers and pod.

24. Pycnospora, R. Br.

A low shrub with slender stems. *Leaves* pinnately trifoliolate; leaflets stipellate; stipules free, membranous, striate. *Flowers* small, purplish, in slender terminal or axillary racemes; bracts membranous, deciduous; bracteoles 0. *Calyx* deeply cleft, the teeth subulate, the 2 upper connate except at apex. *Corolla* exserted; standard orbicular, clawed; wings oblong, oblique, adherent to the obtuse slightly curved keel petals. *Stamens* diadelphous, 9 and 1; anthers uniform. *Ovary* sessile, many-ovuled; style inflexed; stigma minute, capitate. *Pod* oblong, inflated, 2-valved, continuous within, the thin valves transversely veined, 6-10-seeded. *Seeds* small, subreniform, with a minute strophiole.

PYCNOSPORA HEDYSAROIDES, R. Br.; F. B. I. ii. 153. *P. nervosa*, W. & A. 197.

Hills of the Carnatic, Shevaroy and Sirumalais to Tinnevely; W. Gháts and W. Coast from S. Canara southwards, and to 3,000 ft. in Nilgiris and Pulneys.

A slender often trailing plant with the habit of *Desmodium* and the pod of *Crotalaria*; leaflets obovate, prominently nerved, reaching 1.5 in. long.

25. *Pseudarthria*, W. & A.

Herbs and undershrubs, villous or viscid-pubescent. *Leaves* pinnately trifoliolate; leaflets large, stipellate; stipules free, subulate, striate. *Flowers* small, in pairs or fascicled along the rhachis of a terminal or axillary slender raceme, occasionally paniculate; bracts and bracteoles subulate like the stipules. *Calyx*-tube campanulate, cleft to the middle in 2 obscure lips, the 2 upper lobes connate. *Corolla* exserted; standard suborbicular; wings obliquely oblong; keel petals obtuse, not spurred. *Stamens* diadelphous, 9 and 1, anthers uniform. *Ovary* subsessile; ovules many; style subulate, inflexed; stigma small, capitate. *Pod* linear-oblong, flat, continuous within and not jointed, the valves transversely veined. *Seeds* compressed, reniform.

PSEUDARTHRIA VISCIDA, W. & A. 209; F. B. I. ii. 154; Wt. Ic. t. 286.

Nearly all Districts from the Godavari southwards, up to 3,000 ft. in the hills, common in somewhat damp forest undergrowth.

A viscid *Desmodium*-like undershrub with leaflets rhomboid-ovate, repand sinuate on the margins, the pods very sticky and adherent, .72 in. long. .25 in. broad, the flowers pink.

26. *Lourea*, Neck.

Erect or prostrate herbs. *Leaves* 1-3-foliolate; leaflets often broader than long, stipellate; stipules free, subulate. *Flowers* white or reddish, usually in pairs in lax terminal racemes; bracts acuminate, caducous; bracteoles 0. *Calyx* campanulate, reticulately veined, accrescent, persistent, subequally 5-lobed, the uppermost two lobes sometimes partly connate, all lanceolate. *Corolla* short; standard obovate or obcordate; wings obliquely oblong, adnate to the obtuse keel. *Stamens* diadelphous, 9 and 1; anthers uniform. *Ovary* sessile or stipitate, few-ovuled; style subulate, inflexed; stigma capitate. *Pod* a lomentum of 2 or more 1-seeded indehiscent turgid joints folded up within the calyx, the joints thin- and reticulately-valved. *Seeds* reniform or subglobose, strophiole 0.

Erect; end leaflets transverse with two divaricating oblong-lanceolate falcately-recurved 3-nerved obtuse lobes, .5 in. long, 2-3 in. broad, side ones obliquely obcordate1. *Vespertilionis*.

Prostrate and trailing; leaflets suborbicular, emarginate, end one rather broader than long, .25 to .75 in. long.....2. *obcordata*.

1. LOUREA VESPERTILIONIS, Desv.; F. B. I. ii. 154; W. & A. 221; Wt. Ic. t. 285.

An introduced species, occasional as a weed in waste places, sometimes in gardens.

A curiously leaved plant, the leaves often clouded with white; flowers white.

2. LOUREA OBCORDATA, Desv.; F. B. I. ii. 154.

Coimbatore District, at Sengadi, 2,600 ft. (Fischer).

27. *Uraria*, Desv.

Perennial herbs or undershrubs. *Leaves* imparipinnate or 3-foliolate, often 1-foliolate, with subulate stipels; stipules lanceolate, acuminate, scarious, striate. *Flowers* in terminal racemes or panicles of racemes, usually purple or yellow, the racemes often elongate; bracts stipular, ovate or lanceolate, acuminate, striate, conspicuous, persistent or deciduous; bracteoles 0. *Calyx*-tube short, 2-lipped, the upper lip 2-partite, the lower 3-partite, often elongate. *Corolla* small; standard orbicular or obovate, clawed; wings oblong-falcate, adherent to the obtuse keel. *Stamens* diadelphous, 9 and 1; anthers uniform. *Ovary* sessile or shortly stalked, 2-many-ovuled; style inflexed, filiform; stigma capitate. *Pod* a lomentum of 2-6 small, turgid, 1-seeded, indehiscent joints folded within the calyx, occasionally continuous. *Seeds* orbicular or subglobose, strophiole 0.

Upper leaves 5-9-foliolate, the leaflets linear-oblong, clouded; racemes long, cylindrical; calyx-teeth subulate-lanceolate, the lower twice the length of the upper, plumose; lomentum joints 3-6, usually white and polished1. *picta*

Leaves 3- and 1-foliolate intermixed:—

Racemes dense, very hairy; lower teeth of calyx very long, the upper very small; lomentum joints usually 2, smooth and faintly reticulate:—

Trailing undershrub with racemes usually under 1.5 in. long; leaflets 1 or 3, small, ovate, obtuse at apex, mucronate

2. *lagopodioides*.

Erect undershrub with racemes 2-4 in. long; leaflets 1 or 3, large, usually cordate at base, subacute at apex, mucronate

3. *alopecuroides*.

Racemes in panicles, slender, up to 1 ft. long, the flowers distant; calyx-teeth subequal, deltoid-cuspidate; lomentum joints 4-6, brown or black, minutely hispid4. *hamosa*.

1. *URARIA PICTA*, Desv.; F. B. I. ii. 155; W. & A. 221.

N. Circars, in the Sál forests of Ganjam (Gamble).

An erect undershrub reaching 3 ft. in height, recognised by the narrow white-clouded upper leaflets and white joints to the pod.

2. *URARIA LAGOPODIODES*, Merr. *U. lagopoides*, DC.; F. B. I. ii. 156; W. & A. 222; Wt. Ic. t. 289.

W. Gháts, E. slopes of the Pulney Hills (Bourne).

A trailing perennial of grassy lands, the flower racemes short and dense, the leaflets rather small and obtuse.

3. *URARIA ALOPECUROIDES*, Wt. Ic. t. 290. *U. repanda*, Wall.; F. B. I. ii. 156.

N. Circars, in the Ganjam Sál forests; Hills of Mysore, about 3,000 ft.

An erect undershrub of forest undergrowth, the flower racemes elongated, dense; the leaflets often cordate at base.

4. *URARIA HAMOSA*, Wall.; F. B. I. ii. 156; W. & A. 222; Wt. Ic. t. 284.

N. Circars, Deccan and W. Gháts, in dry forest undergrowth, up to 3,500 ft., common.

A straggling undershrub with elongate racemes in panicles and often rather large subacute leaflets.

28. *Alysicarpus*, Neck.

Diffuse or erect herbs. *Leaves* 1-foliolate, sometimes 3-foliolate also; stipules scarious, acuminate, free or connate; stipels subulate. *Flowers* small, in terminal, rarely axillary, racemes or spikes; pedicels usually in pairs; bracts scarious, usually deciduous; bracteoles 0. *Calyx* glumaceous, slightly campanulate, deeply 4-cleft, the upper segment bifid. *Corolla* not exerted; standard obovate or orbicular, narrowed to a claw; wings obliquely oblong, adnate to the keel; keel slightly incurved, obtuse, usually with a lateral appendage on each petal. *Stamens* diadelphous, 9 and 1; anthers uniform. *Ovary* sessile or shortly stipitate, many-ovuled; style filiform, incurved at tip; stigma

capitate. *Pod* a terete or turgid lomentum of several indehiscent 1-seeded joints. *Seeds* suborbicular, strophiole 0.

Calyx shorter or very slightly longer than the first joint of the pod, under 15 in. long:—

Pod moniliform, the joints turgid, subglobose, downy with minute hooked hairs; stem with rather short bristly hairs; leaflets variable in shape, elliptic or lanceolate, obtuse, mucronulate, often cordate at base1, *monilifer*.

Pod not or only occasionally moniliform, the joints turgid, tetragonous, reticulate, nearly glabrous; stems glabrescent; leaflet variable in shape from linear-oblong or -lanceolate to orbicular, usually cordate at base2, *vaginalis*.

Pod not moniliform, curved, the joints flattened, reticulate, with both straight and hooked hairs; stem with long bristly hairs; leaflet orbicular, mucronate, pubescent.....3, *hamosus*.

Calyx much longer than the first joint of the pod, at least 2 in. long:—

Calyx-teeth imbricate in fruit:—

Pod slightly moniliform, joints not transversely ribbed:—

Joints of pod smooth, glabrous; leaflet linear or linear-oblong 1-3 in. long, narrow; racemes 3-6 in. long, very slender

4, *bupleurifolius*.

Joints of pod reticulate, puberulous; leaflet linear-lanceolate, 3-6 in. long, narrow; racemes 6-12 in. long, rather stout

5, *longifolius*.

Pod moniliform, the joints strongly and closely ribbed transversely; leaves usually 1-, sometimes 3-foliolate, variable

6, *rugosus*.

Calyx-teeth not imbricate in fruit:—

Flowers in dense terminal white-silky spikes; leaflets linear-oblong or -lanceolate, 3-ribbed from near the base; pods moniliform, the joints 3-4, strongly reticulate7, *pubescens*.

Flowers in terminal or axillary racemes on long pedicels; upper leaves often 3-foliolate:—

Pod only slightly exsert from the lanceolate golden-pilose calyx-teeth, which are 3 in. long, the joints 3-4, large; leaflets ovate, under 1 in. long; racemes rather close, the pedicels 5 in. long or less.....8, *racemosus*.

Pod much exsert from the setaceous pilose calyx-teeth, which are 2 in. long, the joints 5-6, small; leaflets often up to 1.5 in. long and oblong; racemes lax, the pedicels 5 in. long or more

9, *parviflorus*.

1. *ALYSICARPUS MONILIFER*, DC.; F. B. I. ii. 157; W. & A. 232.
In all dry Districts, especially the E. Coast, on pasture land.
A small prostrate much-branched perennial herb; flowers pink. Vern. *Tel. Amera*.
2. *ALYSICARPUS VAGINALIS*, DC.; F. B. I. ii. 158; W. & A. 233.
In all dry Districts and on both Coasts, on pasture land.
A suberect much-branched herbaceous plant.
Var. *nummularifolius*, Baker in F. B. I. ii. 158. *A. nummularifolius*, W. & A. 232.
As widely distributed as the type from which it differs in the short dense racemes; flowers pink.
3. *ALYSICARPUS HAMOSUS*, Edgew.; F. B. I. ii. 157.
East Coast, at Masulipatam (Bourne); Deccan, at Bellary (Wight).
A slender, diffuse, very hairy, herbaceous plant; flowers bluish-purple.
4. *ALYSICARPUS BUPLEURIFOLIUS*, DC.; F. B. I. ii. 158; W. & A. 233. *Hedysarum bupleurifolium*, Linn.; Roxb. Cor. Pl. t. 194.
In most forest Districts, chiefly among long grass, and up to 3,000 ft. in hilly country.
A very slender perennial with narrow acute leaflets, usually linear, but basal ones sometimes elliptic or even orbicular. Flowers with orange standard and keel and crimson wings; pod with 4-6 joints.
Var. *gracilis*, Baker in F. B. I. ii. 158.
Deccan, Hills of Cuddapah and Coimbatore up to 3,500 ft.; W. Gháts, in the lower Pulneys (Bourne).
Leaves linear-oblong, broader and obtuse at apex; joints of pod 1-3.
5. *ALYSICARPUS LONGIFOLIUS*, W. & A. 233; F. B. I. ii. 159; Wt. Ic. t. 251.
Northern Division (Cleghorn); "cornfields near Ongole, Circars" (W. & A.); "not infrequent in black cotton soil in the Ceded Districts and Circars" (Wight).
A stout erect undershrub reaching 4-5 ft. in height; leaflet 3-6 in. long, reticulate, prominently nerved; pod 3-6-jointed.
6. *ALYSICARPUS RUGOSUS*, DC.; F. B. I. ii. 159; *A. Wallichii*, W. & A. 234.
Hills of the Deccan, in Mysore and Coimbatore up to

3,500 ft.; W. Gháts, in the Anamalais and Pulneys and Travancore Hills at similar levels.

A rather short herbaceous plant with ascending branches, short dense racemes, the calyx-teeth ciliate only, and 1-sometimes 3-foliolate leaflets, elliptic below, linear-oblong above. In addition to this there are also 3 fairly well-marked varieties, viz.:

Var. 1, *Heyneanus*, Baker; F. B. I. ii. 159. *A. Heyneanus*, W. & A. 234.

Stems stouter, up to 3 or 4 ft., usually pubescent; leaflet 1, large obovate-oblong; racemes elongate; calyx-teeth glabrous or slightly ciliate.

N. Circars and Deccan.

Var. 2, *pilifer*, Prain in Journ., As. Soc. Beng. LXVI. ii. 2. 384.

Stems erect, short, with spreading hairs; leaflet 1, oblong below, linear-oblong above; racemes short, dense, the calyx conspicuously long-white-ciliate.

Hills of the Deccan and Carnatic to 3,500 ft.

Var. 3, *styracifolius*, Baker; F. B. I. ii. 159. *A. styracifolius*, W. & A. 234.

A dwarf diffuse plant with spreading hairs; leaflet 1, lower small, upper linear-lanceolate; racemes short, dense, the calyx with spreading hairs.

Deccan and Carnatic, in dry places.

7. *ALYSICARPUS PUBESCENS*, Law in Wt. Ic. t. 250; F. B. I. ii. 160.

N. Circars, in Godavari (Cleghorn).

An erect herb reaching 3-4 ft. high; flowers, at any rate the wings, purple.

8. *ALYSICARPUS RACEMOSUS*, Benth.; Bedd. Ic. t. 292. *A. belgaumensis* var. *racemosus*, Bak. in F. B. I. ii. 160.

N. Circars, Mahendragiri Hill in Ganjam, 4,500 ft. (Fischer); Deccan, Bababudan Hills of Mysore (Talbot); W. Gháts, in Wynaad, Nilgiris, Bolampattis and Anamalais, at 3,000 to 7,000 ft.

An erect herb with golden pubescence and purple flowers.

9. *ALYSICARPUS PARVIFLORUS*, Dalz. *Desmodium parviflorum*, Bak. in F. B. I. ii. 172.

W. Gháts, in the Hills of Mysore, Coimbatore, the Anamalais and Cochin, at 2,000 to 5,000 ft.

An erect annual with lax racemes and purplish flowers.

29. Ougeinia, Benth.

A tree. *Leaves* pinnately 3-foliolate; leaflets large, stipellate; stipules free, deciduous. *Flowers* in densely fascicled racemes in leaf-axils and on old wood; pedicels filiform, fascicled along the rhachis; bracts small, scale-like; bracteoles beneath the calyx, minute, persistent. *Calyx-tube* campanulate, the lobes obtuse, in 2 lips, the upper of 2 connate, the lower of 3. *Corolla* exserted, rose-coloured or white, the petals clawed; standard suborbicular; wings obliquely oblong, spurred, slightly adnate to the obtuse incurved keel. *Stamens* diadelphous, 9 and 1; anthers uniform. *Ovary* sessile, many-ovuled; style incurved, subulate; stigma capitate. *Pod* linear, elongate, flat, of 2 or more oblong, large, more or less distinct, scarcely dehiscent joints. *Seeds* compressed, reniform; cotyledons foliaceous; strophiole 0.

OUGEINIA DALBERGIOIDES, Benth.; F. B. I. ii. 161; Bedd. Fl. t. 36; Brand. For. Fl. t. 23. *Dalbergia oojeinensis*, Roxb.; Wt. Ic. t. 391.

Northern Circars, forests of Ganjam, Vizagapatam and Godavari, up to 4,000 ft; Deccan, scarce in the forests of Mysore to the N. slopes of the Nilgiris; sometimes planted for ornament.

A moderate-sized, often gregarious tree, very pretty when its masses of rose-coloured flowers are open before the new leaves appear. Bark light brown; wood hard, close-grained and tough, with a light brown heartwood, useful for carts and implements. Vern. *Hind.* Sandan; *Ur.* Bandhona; *Mar.* Tiwas; *Tel.* Tella motku.

30. Desmodium, Desv.

Herbs or shrubs, rarely small trees. *Leaves* pinnately 1-3-rarely 5-foliolate; stipules usually striate, dry, free or united into one leaf-opposed one; stipels subulate. *Flowers* usually small, purple or red or white, in copious usually dense, terminal or axillary racemes, sometimes in axillary umbels or fascicles; bracts single or in threes, striate or subulate and persistent or membranous and deciduous; bracteoles large and persistent or minute or wanting. *Calyx-tube* short, campanulate or turbinate, the 2 upper teeth more or less connate, the 3 lower acute or acuminate. *Corolla* exserted; standard obovate or orbicular,

usually narrowed at the base; wings obliquely oblong, more or less adhering to the keel, the petals of which are obtuse, often incurved, sometimes spurred towards the claw. *Stamens* usually diadelphous, 9 and 1, sometimes monadelphous, sometimes with the vexillary filament free in the upper half; anthers uniform. *Ovary* sessile or stalked, 2- many -ovuled; style incurved, sometimes sharply; stigma capitate. *Pod* a lomentum of several 1-seeded joints, the joints usually indehiscent and easily separating, less often dehiscent at one suture, in one section dehiscent along the whole ventral suture. *Seeds* compressed, usually reniform, estrophiolate.

Pods distinctly divided into several 1-seeded joints:—

Flowers in short dense peduncled axillary umbels; shrubs with triquetrous stems and 3-foliolate leaves; stamens monadelphous; pods curved, 4-6-jointed.....1. *Cephalotes*.

Flowers in elongated racemes:—

Joints of pods indehiscent:—

Pods with 1-3 usually 2 joints, the joints round, reticulate; stamens monadelphous, the vexillary one free above the middle; leaves 3-foliolate:—

Racemes with flower fascicles in the axils of conspicuous bifarious floral leaves each with 2 round leaflets and a terminal bristle or rarely an oblong leaflet; leaves large, membranous2. *pulchellum*.

Racemes with flower fascicles in the axils of stipular bracts, not leafy; leaves small, coriaceous.....3. *biarticulatum*.

Pods with oblong compressed joints, 2-4 times longer than broad, with sticky hooked hairs; stamens diadelphous, 9 and 1; racemes slender:—

Leaves 3-foliolate:—

Joints of pod 6-8, each twice longer than broad; leaflets chartaceous, lanceolate4. *laburnifolium*.

Joints of pod 6-10, each 3-4 times as long as broad; leaflets membranous, ovate or ovate-lanceolate.....5. *laxiflorum*.

Leaves 1-foliolate, the leaflet subcoriaceous, ovate or lanceolate; joints of pod 6-8, each 4-5 times as long as broad

6. *ormocarpoides*.

Pods with 1-3 scimitar- or crescent-shaped joints, the lowest stalked; leaves 3-foliolate, membranous, the lowest pair of nerves starting from the base and prominent; flowers in few-flowered very lax racemes; stamens monadelphous:—

Joints of pod 2-3, 3 times as long as broad, narrowed at base, the upper margin concave, the stalk about .5 in. long; leaflets ovate acuminate.....7. *laxum*.

Joint of pod 1, 3 times as long as broad, dolabriform, reticulate, the stalk about .15 in. long; leaflets ovate-rhomboid, elongate above, the apex obtuse.....8. *dolabriforme*.

Joints of pod 1-3, semi-oblong, more or less crescent-shaped, puberulous, the stalk short, about .1 in. long; leaflets broadly ovate-rhomboid, acute at apex, the margins usually repand

9. *Scalpe*.

Pods slightly curved, with 6-8 square joints, the ventral suture very slightly indented; leaflet 1, lanceolate, cordate, the petiole broadly winged; stamens monadelphous, the vexillary one free above the middle.....10. *triquetrum*.

Pods with several moniliform joints, each semicircular; stamens diadelphous:—

Pod straight or slightly indented on the dorsal suture; stipules subulate with a broad base:—

Leaflet 1; calyx-lobes short, triangular:—

Leaflet ovate or lanceolate, acute, glabrescent on upper surface, membranous; stems angular; joints of pod sparsely pubescent with hooked hairs, reticulate

11. *gangeticum*.

Leaflet broadly ovate or deltoid, repand, coriaceous, obtuse or subacute, densely pubescent; stems round, fulvous-hairy; joints of pod densely pubescent with hooked hairs.....12. *latifolium*.

Leaflets 3, the end one rhomboid-lanceolate, the side ones ovate, all acuminate, membranous; racemes very slender, lax; pod 4-6-jointed, slightly indented on the dorsal suture, joints glabrous, pale, reticulate.....13. *Wightii*.

Pod somewhat deeply indented on the dorsal suture as on the ventral, 5-6-jointed, hispid with hooked hairs; stipules broad, amplexicaul, auricled; leaflets elliptic or orbicular, pubescent; racemes many, corolla minute.....14. *diffusum*.

Joints of pods 6-9, reticulate, more or less dehiscent on the ventral suture, the dorsal not or only slightly indented; leaflets 3; stamens diadelphous:—

Pedicels not filiform, deflexed, .2 in. long; flowers large; leaflets elliptic or obovate, obtuse at apex, mucronate, indistinctly nerved, under-surface with innovations very silvery-silky or

tawny; pods slightly curved, slightly indented ventrally,
 ·1-·15 in. broad.....15. *rufescens*.

Pedicels filiform:—

Pedicels ·4-·5 in. long, spreading; flowers large; leaflets lanceolate, acute or slightly obtuse at apex, prominently nerved, under-surface softly tawny-villous; pods curved, reticulate, glabrous, pale when dry, slightly indented ventrally, ·2 in. broad.....16. *wynadense*.

Pedicels ·15 in. long, erect; flowers small; leaflets elliptic or obovate obtuse, indistinctly nerved, more or less pubescent beneath; pods straight, fragile, slightly indented ventrally, ·1 in. broad.....17. *polycarpum*.

Flowers in short racemes or axillary; stamens diadelphous:—

Leaflet 1, elliptic, cordate at base, emarginate at apex, up to 1·7 in. long, sparsely strigose beneath; racemes up to 1 in. long, crowded, the pedicels recurved, the calyx white-villous; pod with 1-3 joints, subglabrous.....18. *brachystachyum*.

Leaflets usually 1, sometimes 3, the side ones much smaller than the terminal, the latter orbicular, cordate, 1-2 in. long and broad, densely appressed white silky beneath; racemes crowded, up to 1 in. long, pedicels reflexed; calyx white- or tawny-villous; pod with 3-5 joints, slightly pubescent.....19. *retroflexum*.

Leaflets 3, small, never over 1 in. long; trailing herbs:—

Flowers all axillary, 1-3 together; pedicels ·35 in. long; leaflets obovate cuneate, truncate or emarginate at apex; pods 3-5-jointed, straight on the dorsal, indented on the ventral suture; ·1 in. broad 20. *triflorum*.

Flowers both 1-3 together axillary and 2-6 in small lax racemes; pedicels ·5 in. long; leaflets elliptic or obovate, rounded at apex; pods 4-5-jointed, straight on the dorsal, indented on the ventral suture, ·2 in. broad

21. *heterophyllum*.

Flowers all in lax racemes:—

Joints of pod 1-2, longer than broad, the dorsal suture straight, the ventral deeply indented; leaflets obovate, emarginate; racemes lax, 6-8-flowered22. *Rottleri*.

Joints of pod 3-4, as broad as long, both sutures distinctly indented; leaflets very small and even minute, obovate; racemes terminal, filiform, with filiform pedicels

23. *parvifolium*.

Pods dehiscing in a continuous line along the ventral suture, the 5-10 joints not separating; leaflets 3, the end one large, oblong-

lanceolate, up to 4 in. long, the side ones very small and moving in jerks; flowers large; stamens diadelphous.....24. *gyrans*.

1. *DESMODIUM CEPHALOTES*, Wall.; F. B. I. ii. 161; W. & A. 244; Wt. Ic. t. 373.

Var. *congestum*, Prain. *D. congestum*, Wall.; W. & A. 224; Wt. Ic. t. 209.

Northern Circars, Hills of the Deccan and Carnatic, and W. Gháts, up to 3,000 ft., in forest undergrowth, especially with teak in the South, with Sál in the North.

A shrub, with white silky triquetrous branchlets, white or yellowish flowers, and 4-6-jointed, nearly glabrous curved pods. Vern. *Tel.* Chetenda.

2. *DESMODIUM PULCHELLUM*, Benth.; F. B. I. ii. 162. *Dicerna pulchellum*, DC.; W. & A. 230; Wt. Ic. t. 418.

In most dry forest Districts, in forest undergrowth, up to 4,000 ft.

A shrub, easily recognized by its conspicuous floral leaves, and large ovate-lanceolate repand leaflets; flowers pale yellow; pod usually 2-jointed, long-apiculate.

3. *DESMODIUM BIARTICULATUM*, Benth.; F. B. I. ii. 163. *Dicerna biarticulatum*, W. & A. 230; Wt. Ic. t. 419.

E. Coast Districts from the Chilka Lake to Cape Comorin and on W. Coast as far North as Quilon, in sandy places chiefly; rare inland, Cuddapah and Salem.

A slender shrub with small coriaceous cinereous leaves, bright red flowers and 2-jointed reticulate pod, the floral leaves reduced to chaffy stipules.

4. *DESMODIUM LABURNIFOLIUM*, DC.; F. B. I. ii. 163.

E. Gháts, Hills of Vizagapatam at about 4,000 ft. (A. W. Lushington).

A slender shrub with lanceolate leaflets, whitish flowers in long racemes and slender pods with oblong sticky joints very easily separable.

5. *DESMODIUM LAXIFLORUM*, DC.; F. B. I. ii. 164. *D. recurvatum*, Grah.; W. & A. 226; Wt. Ic. t. 374. *D. diffusum*, DC. Prodr. ii. 335, No. 88; Wt. Ic. t. 409.

W. Gháts, in Mysore, Coimbatore, Nilgiris and Travancore, up to 3,000 ft.

An erect undershrub up to 5 ft. high with angular stems,

rather large leaves and flowers in fascicles on a long slender raceme, the standard white, wings and keel blue.

6. *DESMODIUM ORMOCARPOIDES*, DC.; F. B. I. ii. 164.

W. Gháts, in Mysore, the Anamalais, Tinnevely and Travancore, up to 3,500 ft.

A slender erect undershrub with a single lanceolate acuminate leaflet reaching 7 in. long, and pale violet flowers in few-flowered distant fascicles in lax racemes.

7. *DESMODIUM LAXUM*, DC. *D. podocarpum* var. *laxum*, Bak. in F. B. I. ii. 165. *D. Gardneri*, Benth.; F. B. I. ii. 165.

W. Gháts, in the Atapadi, Anamalai and Sivagiri Hills, up to 3,000 ft.

An erect, usually single-stemmed undershrub with pink flowers and scimitar-shaped joints to the pod.

8. *DESMODIUM DOLABRIFORME*, Benth.; F. B. I. ii. 165.

W. Gháts, in the Hills of Tinnevely.

An undershrub with short erect stem, crowded leaves, slender erect racemes and single-jointed pod.

9. *DESMODIUM SCALPE*, DC.; F. B. I. ii. 165. *D. strangulatum*, W. & A. 228; Wt. Ic. t. 985.

W. Gháts, from Mysore and Coimbatore southwards at 3,000 to 7,000 ft., in shady woods; Shevaroy Hills in Salem.

An erect herbaceous undershrub with rather large brick-red flowers and usually pubescent leaves with prominent stipules.

10. *DESMODIUM TRIQUETRUM*, DC.; F. B. I. ii. 163; W. & A. 224.

N. Circars, forests from Ganjam to Godavari; W. Gháts, from S. Canara to Travancore, up to 3,000 ft.

An erect shrub with leaflets up to 6-8 in. long and triquetrous stems; flowers purple; pod appressed-pubescent.

11. *DESMODIUM GANGETICUM*, DC.; F. B. I. ii. 168; W. & A. 225; Wt. Ic. t. 271. *D. collinum*, Wt. Ic. t. 272.

N. Circars, forests in the hills, to 3,000 ft. on Mahendragiri; W. Gháts, in dry forests at low levels; Shevaroy Hills of Salem; in forest undergrowth.

An erect undershrub reaching 3-4 ft. with white or lilac-tinged flowers.

Var. *maculatum*, Bak. in F. B. I. ii. 668.

N. Circars, in Ganjam Sál forests (Gamble).

A dwarf undershrub reaching about 1 ft. in height; leaflets ovate, obtuse or cordate at base, usually under 1 in. long.

12. *DESMODIUM LATIFOLIUM*, DC.; F. B. I. ii. 168; W. & A. 225; Wt. Ic. t. 270.

N. Circars, forests in the Hills of Godavari; W. Gháts, in dry forests, up to 3,000 ft., chiefly on the east side; usually in open glades.

An erect undershrub, up to 6 ft. high, with purple flowers, pod sometimes 1-jointed.

13. *DESMODIUM WIGHTII*, Grah.; F. B. I. ii. 169; W. & A. 226.

W. Gháts, in the Nilgiri and Pulney Hills, at low levels.

A slender erect herbaceous plant with long racemes.

14. *DESMODIUM DIFFUSUM*, DC. Prod. ii. 336; W. & A. 226; Wt. Ic. t. 208. *D. quinquangulare*, Wt. Ic. t. 293.

Deccan, in Guntur, also rising to 3,000 ft. in Mysore.

A diffuse straggling plant with angled stems and broad stipules, the flowers very small.

15. *DESMODIUM RUFESCENS*, DC.; F. B. I. ii. 171; W & A. 228; Wt. Ic. t. 984, Ill. t. 79.

W. Gháts, in the Nilgiri, Anamalai and Pulney Hills, common from 4,000 to 7,000 ft.; Hills of Coimbatore and Shevaroy Hills of Salem.

An erect pretty shrub with purple flowers and silvery silky branches and foliage.

16. *DESMODIUM WYNAADENSE*, Bedd. M.S. ex Gamble in Kew Bull. 1918, ined.

W. Gháts, Nilgiri, Anamalai and Travancore Hills, at 2,000 to 5,000 ft.

A handsome erect undershrub with large purple flowers, lanceolate leaflets and curved rather broad reticulate pod with dehiscent joints.

17. *DESMODIUM POLYCARPUM*, DC.; F. B. I. ii. 171; W. & A. 277; Wt. Ic. t. 406. *D. patens*, Wt. Ic. t. 407.

In all Districts, rising to 3,000 ft. in the hills.

An erect or suberect, sometimes trailing undershrub, with leaflets variable in shape and size, usually obovate, purple-blue flowers and very easily disarticulated pods, strongly ciliate on the sutures. Vern. *Tel.* Adivi utchinta.

Var. *trichocaulon*, Bak. in F. B. I. ii. 172.

W. Gháts, from S. Canara to the Pulneys, usually at 3,000 to 6,000 ft.; Shevaroy Hills.

Stems with spreading grey hairs; leaves more villous beneath, racemes more elongate and lax, pods pubescent all over, not so ciliate on the sutures or so fragile; sometimes white flowers.

Var. *Fischeri*, Gamble.

Hills of Coimbatore at Bailur, 3,800 ft. (Fischer); Travancore Hills, 4,700 ft. (Venkoba Row).

Stems grey-pubescent; leaflets small, obovate, almost truncate at apex, mucronate, white-villous beneath; racemes close, the flowers large; pods glabrous, not ciliate on the sutures.

18. *DESMODIUM BRACHYSTACHYUM*, Grah.; F. B. I. ii. 171.

N. Circars, Sál forests of Ganjam, under light cover (Gamble).

A slender undershrub up to 2 ft. high with deep purple flowers.

19. *DESMODIUM RETROFLEXUM*, DC.; F. B. I. ii. 170. *Uraria* ? *styracifolia*, W. & A. 222.

W. Coast, foot of the Gháts in Malabar (Beddome, Fischer); Pulney Hills, 4,000 ft. (Saulière).

A large shrub (*Beddome*) with purple flowers, the pod nearly straight on the dorsal suture.

20. *DESMODIUM TRIFLORUM*, DC.; F. B. I. ii. 173; W. & A. 229 *in part*; Wt. Ic. t. 292.

All plains Districts and up to 3,000 ft. in hills, a common weed.

A wiry much-branched herb, rooting and spreading over the ground like the small clovers; flowers pink or white.

21. *DESMODIUM HETEROPHYLLUM*, DC.; F. B. I. ii. 173. *D. triflorum*, W. & A. 229 *in part*; Wt. Ic. t. 291.

Plains Districts of E. and W. Coast, scarce.

Similar to the last, but larger, the leaflets sometimes reaching 1 in. in length; flowers purple.

22. *DESMODIUM ROTTLEI*, Bak. in F. B. I. ii. 174. *Eleiotis Rottleri*, W. & A. 231.

Plains of Mysore (Rottler).

A small trailing plant with 1-2-jointed pods.

23. *DESMODIUM PARVIFOLIUM*, DC.; F. B. I. ii. 174; W. & A. 229.

W. Gháts, in the Nilgiri and Pulney Hills, usually above 5,000 ft., in grass and on banks.

A pretty densely caespitose trailer with blue or pink flowers.

24. *DESMODIUM GYRANS*, DC.; F. B. I. ii. 174; W. & A. 227; Wt. Ic. t. 294.

N. Circars, Deccan and Hills of Carnatic, also W. Gháts, up to about 3,000 ft., in grass lands and forest undergrowth, widespread, but nowhere very common. The Semaphore plant.

An erect undershrub with pink flowers, reaching 3-4 ft. in height: the gyrating side leaflets are sometimes absent.

31. *Vicia*, Linn.

Annual or 'perennial herbs. *Leaves* paripinnate, the rhachis ending in a twisted tendril; stipules semisagittate; stipels 0. *Flowers* subsessile or in peduncled axillary racemes; bracts small, caducous; bracteoles 0. *Calyx*-tube campanulate; teeth long, often unequal. *Corolla* more or less exserted; standard obovate, emarginate, with a broad claw; wings oblong, oblique adnate in their middle to the shorter keel. *Stamens* diadelphous, 9 and 1, the vexillary one sometimes slightly connate with the rest. *Ovary* nearly sessile, 2-many-ovuled; style inflexed, usually with a dorsal tuft of hairs or ring of hairs below the apex; stigma capitate. *Pod* compressed, continuous within. *Seeds* globose or compressed.

VICIA SATIVA, Linn.; F. B. I. ii. 178.

Nilgiri Hills, about Ootacamund, run wild. Common Vetch or Tare.

A slender climbing herb with reddish-blue flowers.

The following species also occur only in cultivation, or as escapes, or as casual weeds:—

VICIA FABA, Linn. "Bean." cultivated in gardens.

LENS ESCULENTA, Moench. "Lentil." Vern. *Hind.* Masúr, rare in cultivation.

LATHYRUS SATIVUS, Linn. "Chikling Vetch." Vern. *Hind.* Kasári, also rare.

LATHYRUS APHACA, Linn. has been found as a weed in the Nilgiris.

PISUM SATIVUM, Linn. "Pea," and PISUM ARVENSE, Linn. "Field Pea." are found in cultivation.

CICER ARIETINUM, Linn. "Gram." Vern. *Hind.* Chana, sometimes cultivated.

32. Abrus, L.

Climbing shrubs. *Leaves* abruptly pinnate with many pairs of leaflets, the rhachis ending in a bristle; stipules subscarios, deciduous; stipels minute. *Flowers* in fascicles in dense thickened racemes on axillary peduncles or short branches; bracts small, deciduous; bracteoles under the calyx 2, deciduous. *Calyx*-tube small, campanulate, truncate, the teeth very short. *Corolla* much exserted; standard broadly ovate, narrowed into a short claw, slightly adherent to the staminal tube; wings narrow, oblong-falcate; keel curved. *Stamens* 9, in a sheath, the vexillary one absent, anthers uniform. *Ovary* subsessile, many-ovuled; style short, incurved, not bearded; stigma capitate. *Pod* oblong or linear, more or less compressed, thinly septate between the seeds, early dehiscent. *Seeds* globose or compressed, hilum near the top.

Leaflets large, ligulate-oblong:—

Leaflets up to .75 in. long, .25 in. broad; pod thick, 1-1.5 in. long, .5 in. broad, wrinkled; seeds rounded, hard, scarlet or white with a black spot or white only1. *precatorius*.

Leaflets up to 1.5 in. long, .5 in. broad; pod thin, flat, 2-2.5 in. long, .5 in. broad, smooth; seeds compressed, black ...2. *pulchellus*.

Leaflets very small, linear-ligulate, about .25 in. long, under .1 in. broad; pod compressed, linear-oblong, 1-1.25 in. long, .3 in. broad; seeds rounded3. *fruticulosus*.

1. ABRUS PRECATORIUS, Linn.; F. B. I. ii. 175; W. & A. 236.

Most Districts, in hedges and among bushes, on open lands.

A rather conspicuous wiry climber with pink flowers and usually scarlet seeds with a black end. They are very hard, used for jeweller's weights and for necklaces and other ornaments. Vern. *Hind.* Gunchi, Rakti; *Ur.* Kaincho; *Tam.* Kuntumani; *Mal.* Kunni.

2. ABRUS PULCHELLUS, Wall.; F. B. I. ii. 175.

S. Canara (Barber).

A wiry climber similar to the last, but with different pods.

3. ABRUS FRUTICULOSUS, Wall.; F. B. I. ii. 176; W. & A. 236; Wt. Ic. t. 33.

Malabar and Tinnevely, scarce.

A wiry climber with slender branches and very small Acacia-like leaves.

33. Shuteria, W. & A.

Slender climbing herbs. *Leaves* pinnately 3-foliolate; stipules scarious, striate; stipels subulate. *Flowers* in axillary racemes, solitary or in pairs on the rhachis; bracts persistent, striate; bracteoles 2, small. *Calyx*-tube gibbous, teeth distinct, the 2 upper connate, the lateral ones shorter than the others. *Corolla* exserted; standard obovate, narrowed at the base into a claw; wings oblique, sharply spurred, slightly adherent to the shorter obtuse keel. *Stamens* diadelphous, anthers uniform. *Ovary* sessile, many-ovuled; style incurved, not bearded; stigma capitate. *Pod* linear, flat, recurved, the valves thin, twisted when open, slightly septate. *Seeds* oblong-reniform, estrophiolate.

SHUTERIA VESTITA, W. & A. 207; F. B. I. ii. 181, *excl.* vars. 2 and 3; Wt. Ic. t. 165. *S. glabrata*, W. & A. 207.

N. Circars, on Mahendragiri at 4,500 ft.; W. Gháts, Hills of Mysore, Nilgiris and Pulneys at 2,000 to 6,000 ft.; Shevaroy Hills of Salem.

A slender climber with ovate slightly acute mucronate leaflets, the end one subrhomboid, the flowers purplish-red, the seeds brown.

34. Dumasia, DC.

Slender twining herbs. *Leaves* pinnately 3-foliolate; stipules setaceous; stipels minute. *Flowers* yellow, in axillary racemes, solitary or in pairs on the rhachis; bracts small, narrow; bracteoles minute. *Calyx*-tube gibbous, cylindrical, mouth very oblique, truncate. *Corolla* exserted; standard obovate, erect, auricled on both sides above the rather long claw; wings and keel slightly adherent, very long-clawed, the blades small, obtuse. *Stamens* diadelphous; anthers uniform. *Ovary* substipitate,

many-ovuled, linear; style long, filiform, incurved, flattened at the curve, not bearded; stigma capitate. *Pod* sessile, linear, compressed, torulose. *Seeds* subglobose, estrophiolate, the testa hard, blue-black.

DUMASIA VILLOSA, DC.; F. B. I. ii. 183. *D. congesta*, W. & A. 206; Wt. Ic. t. 445.

W. Gháts, Hills of Mysore, the Nilgiris and Pulneys, above 6,000 ft.

A slender climber with ovate obtuse apiculate often velvety leaflets, yellow flowers and a velvety torulose pod.

35. Glycine, Linn.

Herbs, twining or prostrate, rarely suberect. *Leaves* pinnately 3-7-foliolate; stipules small; stipels subulate. *Flowers* small, in axillary racemes, solitary or fascicled on the rhachis; bracts small; bracteoles setaceous or linear, sometimes long. *Calyx*-tube campanulate, teeth long or short, the upper connate at the base or for half their length. *Corolla* hardly exerted; standard suborbiculate, slightly auricled above the claw; wings narrow, auricled, more or less connate with the shorter obtuse keel. *Stamens* at first monadelphous, the vexillary one afterwards free. *Ovary* sessile, many-ovuled; style short, incurved; stigma capitate. *Pod* linear or linear-oblong, septate between the seeds. *Seeds* slightly compressed, estrophiolate.

Leaves 3-foliolate; bracteoles and calyx-teeth long, very villous; pod densely villous, deflexed, torulose.....1. *javanica*.

Leaves 5-7-foliolate; bracteoles minute, calyx-teeth short, deltoid; pod flat, appressed pubescent, spreading, not torulose

2. *pentaphylla*.

1. GLYCINE JAVANICA, Linn.; F. B. I. ii. 183. *Notonia Wightii*, W. & A. 208. *Johnia Wightii*, W. & A. 449.

W. Gháts, Hills of Mysore, Nilgiris and Pulneys, up to 6,000 ft.

An extensively climbing plant with reddish flowers in long dense racemes and large pubescent leaflets, the side ones unequally ovate-cordate, the end one rhomboid-ovate.

2. GLYCINE PENTAPHYLLA, Dalz.; F. B. I. ii. 184.

W. Gháts, in Wynaad (Beddome).

A large climbing herb with reddish flowers in long spicate

racemes, usually 7-foliolate leaves and oblong lanceolate mucronate leaflets, the end one much the longest.

36. *Teramnus*, Sw.

Slender twining herbs. *Leaves* pinnately 3-foliolate; stipules small; stipels subulate. *Flowers* very small, in very slender axillary racemes, solitary or fascicled on the rhachis, sometimes in fascicles or pairs; bracts small; bracteoles linear or lanceolate. *Calyx*-tube campanulate, teeth distinct or the 2 upper connate to the middle. *Corolla* little exerted; standard obovate, narrowed into the claw; wings oblong, narrow, adherent to the obtuse keel, both long-clawed. *Stamens* monadelphous; anthers alternately perfect and small and sterile. *Ovary* sessile, many-ovuled; style short, thick, not bearded; stigma capitate. *Pod* linear, compressed, narrow, septate between the seeds, ending in a hook formed by the persistent style. *Seeds* slightly oblong, estrophiolate.

Leaflets ovate, acute, nearly glabrous, end one up to 2 in. long, side ones 1.5 in.; racemes very slender, nearly glabrous; pod glabrous except a few acicular hairs 1. *labialis*.
 Leaflets ovate-lanceolate, acute, strigosely hairy, end one up to 6 in. long, side ones as long or slightly shorter; racemes slender, villous with tawny spreading hairs; pod also villous with tawny hairs

2. *mollis*.

1. *TERAMNUS LABIALIS*, Spr.; F. B. I. ii. 184. *Glycine labialis*, Linn.; W. & A. 208; Wt. Ic. t. 168.

N. Circars, in Godavari; Deccan, in Mysore and Coimbatore; Carnatic, about Madras and in S. Travancore, widespread but not common.

A twining herb with ovate acute leaflets, minute reddish flowers and narrow elongate papery hooked pods which open early and twist in spirals.

2. *TERAMNUS MOLLIS*, Benth. *T. labialis* var. *mollis*, Baker in F. B. I. ii. 184. *Glycine mollis*, W. & A. 209.

Brumagiri Hills, Malabar (Beddome); Tinnevely Hills (Wight).

A twining herb.

37. *Erythrina*, Linn.

Trees or rarely undershrubs, the branches, sometimes also the stems, usually studded with prickles. *Leaves* pinnately 3-foliate; stipules small; stipels gland-like. *Flowers* large and showy, scarlet or sometimes white, in dense peduncled axillary or terminal racemes, in pairs or fascicles on the rhachis; bracts and bracteoles small or 0. *Calyx* oblique at the mouth, spathaceous or campanulate with very short teeth. *Corolla* long-exsert, the petals very unequal, the standard much exceeding the wings and keel. *Stamens* 10, the vexillary filament free in the upper two-thirds, sometimes altogether, the rest free above, alternately longer and shorter; anthers uniform. *Ovary* stipitate, many-ovuled; style curved, subulate at the apex, not bearded; stigma capitate. *Pod* stipitate, falcate, turgid, torulose, dehiscing as a follicle. *Seeds* ovoid, hilum lateral, oblong, strophiole 0.

Calyx spathaceous, oblique, split on one side:—

Calyx split to the base, recurved, 5-toothed at the tip; flowers very large, the standard 2-2·5 in. long, wings and keel subequal, 5-7 in. long, the keel petals free; pod 6-12 in. long, thick, torulose, 6-8-seeded; prickles on branches nearly black; leaflets broadly deltoid, acute, membranous1. *indica*.

Calyx split half-way down, erect; flowers large, the standard 1-1·25 in. long:—

Tip of calyx entire; wings minute, 2 in. long, keel petals combined, 75 in. long; pod stalked, 6-8 in. long, thin, 2-5-seeded; prickles on branches pale green; leaflets broadly deltoid-ovate, abruptly acuminate, membranous.....2. *stricta*.

Tip of calyx minutely toothed: wings and keel about equal, 5 in. long, the keel petals free; stamens diadelphous; leaflets broadly ovate, abruptly acuminate, subcoriaceous...3. *mysorensis*.

Calyx not spathaceous, splitting into two lips; flowers large, standard 1·5-2 in. long, wings minute, 25 in. long, keel petals combined, 6 in. long; pod 3-6 in. long, thin, torulose, 2-5-seeded; prickles on branches yellowish-white; leaflets rhomboid ovate, entire or sinuate lobed, obtuse, densely tomentose beneath.....4. *suberosa*.

1. *ERYTHRINA INDICA*, Lam.; F. B. I. ii. 188; W. & A. 260; Wt. Ic. t. 58.

Planted in hedges and as a support for pepper, perhaps wild on the E. Coast. Coral-tree.

A striking tree in flower. Bark yellowish, smooth, shining, papery; wood very soft and white but fairly durable and in use like that of *E. suberosa*. Vern. *Hind.* Mandara. Pangra.

2. *ERYTHRINA STRICTA*, Roxb.; F. B. I. ii. 189; W. & A. 260; Bedd. Fl. t. 175.

West Coast, in Malabar and Travancore.

A moderate-sized tree with corky bark armed with prickles, the wood white, soft and spongy but tough, used for fishing-net floats. Vern. *Tam. Mal.* Murukku.

3. *ERYTHRINA MYSORENSIS*, Gamble in Kew Bull., 1918, ined. Mysore at Chikanhalli, 3,000 ft. (Meebold).

Apparently a small tree with few or no prickles.

4. *ERYTHRINA SUBEROSA*, Roxb.; F. B. I. ii. 189; W. & A. 260. *E. sublobata*, Roxb.; W. & A. 261.

N. Circars and Deccan, in dry forests, up to 3,000 ft.

A moderate-sized deciduous tree with thick corky grey bark and white soft wood, fibrous but tough. The wood is used for scabbards, boxes and jars, and for covering with lacquer, it weighs about 19 lbs. per c. ft. Vern. *Hind.* Pangra; *Ur.* Paldua, Chaldua; *Tel.* Mulu modugu.

38. *Mucuna*, Adams.

Large twining shrubs or herbs. *Leaves* pinnately 3-foliolate; stipules deciduous; stipels minute, subulate. *Flowers* large, purple or greenish, turning black when dried, fasciculately racemed on usually long axillary or lateral peduncles, sometimes subcymose, the rhachis nodose; bracts deciduous; bracteoles small. *Calyx*-tube widely campanulate, the lowest tooth long, the lateral short, the upper 2 connate. *Corolla* much exserted; standard about half the length of the wings and keel, folded, auricled at base; wings oblong or ovate, incurved, semisagittate at base; keel as long as or longer than the wings, incurved, acute or beaked. *Stamens* diadelphous; anthers dimorphous, the longer basifixed, the shorter ovate and bearded. *Ovary* sessile, villous, few- or many-ovuled; style filiform; stigma capitate. *Pod* very variable in shape and sculpture, usually covered with fine brittle needle-like irritant bristles. *Seed* orbicular with long linear hilum or transversely oblong with short hilum; strophiole 0.

Woody climbers with perennial stems; seeds large, flat, with long hilum :—

Pods winged on the sutures, large :—

Pods transversely or obliquely plaited on their faces; flowers dark purple; bristles orange-red :—

Pods nearly as broad as long, 1-seeded; flowers 1·5 in. long; leaflets more or less pubescent beneath.....1. *monosperma*.

Pods twice as long as broad, 2-seeded; flowers 2·5 in. long; leaflets nearly glabrous beneath.....2. *atropurpurea*.

Pods not plaited on their faces which are flat; flowers pale green or yellow, 1·5 in. long; bristles yellowish-brown; leaflets glabrous
3. *gigantea*.

Herbaceous climbers with annual stems and purple flowers; seeds 5-6, oblong with an oblong funicular hilum :—

Pods 3-4 in. long, curved, with dark silvery-brown hairs; leaflets densely golden-silky-tomentose beneath; flowers 1·5-2 in. long
4. *hirsuta*.

Pods 2-3 in. long, curved like an S and ridged longitudinally; leaflets with short appressed white hairs beneath; flowers 1-1·5 in. long 5. *prurita*.

1. *MUCUNA MONOSPERMA*, DC.; F. B. I. ii. 185; W. & A. 254.
N. Circars, near Samulcotta, *vide* Wight; Deccan, Hills of Mysore at 2,000 to 3,500 ft.; W. Gháts, in Wynaad at 3,000 ft.

A woody climber with large nearly orbicular plaited pod and single seed.

2. *MUCUNA ATROPURPUREA*, DC.; F. B. I. ii. 186; W. & A. 254.
Deccan, Hills of Mysore and N. Coimbatore at 3,000 ft.; W. Gháts, in the Pulney Hills, Sirumalais and Hills of Tinnevely.

A woody climber like the last but with oblong 2-seeded pods and narrower thinner leaflets.

3. *MUCUNA GIGANTEA*, DC.; F. B. I. ii. 186; W. & A. 254.
Coast forests about Negapatam and in Malabar, in sandy soils, *vide* Wight, etc.

A woody climber with pale green or yellow flowers and broad prominently winged pod.

4. *MUCUNA HIRSUTA*, W. & A. 254; F. B. I. ii. 187.
W. Gháts, Nilgiri and Pulney Hills, at low levels (Bourne).
A climber with annual stems and silky shining leaves.

5. *MUCUNA PRURITA*, Hook. Bot. Misc. ii. 348, t. xiii; W. & A. 255. *M. pruriens*, Bak. in F. B. I. ii. 187 *not of* DC.

East and West Coast regions, twining among hedges and bushes. Cowhage.

A slender climber with annual shoots, leaves pubescent. The irritant hairs are very troublesome. Vern. *Hind.* Kiwách; *Tel.* Piliadagu kaila; *Tam.* Poonaykali.

39. *Galactia*, P. Browne.

Prostrate or twining herbs. *Leaves* pinnately 3-foliolate, rarely 1-5 or -7-foliolate; stipules small, deciduous; stipels subulate. *Flowers* small or moderate-sized, in axillary racemes, paired or fascicled at the very slightly swollen nodes; bracts setaceous; bracteoles minute. *Calyx*-tube short; teeth lanceolate or linear, the 2 upper connate into one. *Corolla* slightly exserted; standard ovate or orbicular, slightly auriculate; wings narrowed, adnate to the nearly straight obtuse keel. *Stamens* diadelphous; anthers uniform. *Ovary* subsessile, many-ovuled; style filiform, beardless; stigma capitate. *Pod* linear, straight or incurved, subseparate between the seeds. *Seeds* somewhat compressed; strophiole 0.

Leaflets elliptic, almost membranous, thinly grey-silky beneath, obtuse or emarginate, mucronate, up to 1·5 in. long, ·7 in. broad, main nerves about 6; calyx-lobes narrow, lanceolate, glabrescent; pod 1 in. long, thinly grey-silky.....1. *tenuiflora*.

Leaflets linear-oblong, subcoriaceous, very slightly appressed-villous beneath, obtuse, mucronate, up to 2·5 and even 5 in. long, ·5-·7 in. broad, main nerves about 10; calyx-lobes rather broad, acuminate, glabrescent; pod 1·5 in. long, glabrous2. *longiflora*.

Leaflets oblong-lanceolate, submembranous, densely villous beneath, obtuse, mucronate, up to 3·5 in. long, 1·2 in. broad, main nerves about 7-8; calyx-lobes broad, acuminate, very villous; pod villous

3. *villosa*.

1. *GALACTIA TENUIFLORA*, W. & A. 206; F. B. I. ii. 192.

N. Circars, Deccan and Carnatic, not common.

A slender wiry climber with reddish flowers and small leaves.

2. *GALACTIA LONGIFOLIA*, Benth.; Wt. Ic. t. 482. *G. tenuiflora*, var. *lucida*, Bak. in F. B. I. ii. 192.

W. Gháts, in the Hills of Coimbatore, the Nilgiris and Pulneys, up to 3,000 ft.

A slender climber distinguished by its narrow leaflets.

3. GALACTIA VILLOSA, W. & A. 207. *G. tenuiflora* var. *villosa*, Bak. in F. B. I. ii. 192.

W. Gháts, in the Nilgiris and Pulneys, up to 6,000 ft.

A slender climber but stouter and with larger leaflets than the others.

40. Butea, Roxb.

Trees or large climbing shrubs. *Leaves* pinnately 3-foliolate, leaflets large; stipules small, caducous; stipels subulate. *Flowers* large, showy, densely fascicled in axillary or terminal racemes or panicles; bracts and bracteoles narrow, caducous. *Calyx* broadly campanulate, the teeth deltoid, short, the 2 upper connate in an entire or emarginate lip. *Corolla* much exserted; standard ovate or lanceolate, acute, recurved, equal to or shorter than the keel; wings falcate, adnate to the much incurved acute keel. *Stamens* diadelphous; anthers uniform. *Ovary* sessile or shortly stalked, 2-ovuled; style long, incurved, beardless; stigma very small, terminal. *Pod* an oblong follicle, the base flat, wing-like and indehiscent, the tip splitting round the single apical seed. *Seed* obovate, compressed; hilum small; strophiole 0.

An erect tree; lowest calyx-tooth much shorter than the side ones base of pod rounded, almost semi-cordate, breadth of pod 1·5 in.

1. *frondosa*.

A large climbing shrub; lowest calyx-tooth equal to the side ones; base of pod narrowed; breadth of pod 1 in.....2. *superba*.

1. BUTEA FRONDOSA, Koen.; Roxb. Cor. Pl. t. 21; F. B. I. ii. 194; W. & A. 261; Bedd. Fl. t. 176.

In all dry Districts both in open country and deciduous forests, frequently gregarious, less common in the Circars than in the Deccan. Common on black cotton soil, also on salt lands.

A deciduous tree, very conspicuous when in flower before the leaves appear, the large flowers being orange-scarlet set in dark velvety calyces, the large leaflets broadly obovate, coriaceous and reticulate. The wood is grey, soft, and said to be durable under water. It yields a red "Kino" gum and the lac insect is grown upon it. Vern. *Hind.* Dhák, Palás; *Ur.* Porásu; *Tel.* Modugu; *Tam.* Porasu; *Mal.* Palasin samatha.

2. *BUTEA SUPERBA*, Roxb. Cor. Pl. t. 22; F. B. I. ii. 195; W. & A. 261.

N. Circars, in the forests of Ganjam and Vizagapatam.

An immense climbing shrub, the leaves and flowers and pods very like those of *B. frondosa*, but the flowers rather more yellow and slightly larger. Like it also, it gives a "Kino" gum and the flowers a red dyë.

41. *Spatholobus*, Hassk.

Large climbing shrubs. *Leaves* pinnately 3-foliolate; stipules small, deciduous; stipels small, subulate. *Flowers* small, in large terminal panicles extending to the axils of the upper leaves; pedicels fascicled; bracts and bracteoles small, deciduous. *Calyx* campanulate; teeth lanceolate or deltoid, the two upper connate. *Corolla* exserted, the petals subequal, clawed; standard ovate or orbicular; wings obliquely oblong, free; keel straight, obtuse, auricled above the claw. *Stamens* diadelphous; anthers uniform. *Ovary* sessile or stalked, 2-ovuled; style subulate, incurved, beardless; stigma capitate. *Pod* an oblong, often somewhat falcate, follicle, the base flat, wing-like, reticulate and indehiscent, the tip splitting round the single apical seed. *Seed* compressed; hilum small; strophiole 0.

Leaflets large, the terminal one reaching sometimes 12 in. long by 9 in. broad, usually shining silky pubescent beneath; corolla cream-coloured; pod tomentose, stalked, 3-4 in. long by 1-1½ in. broad

1. *Roxburghii*.

Leaflets rather small, up to 5 in. long by 2.5 in. broad, glabrous beneath; corolla purple; pod glabrous, sessile, 4 in. long by .75 in. broad.....2. *purpureus*.

1. *SPATHOLOBUS ROXBURGHII*, Benth.; F. B. I. ii. 193. *Butea parviflora*, Roxb.; W. & A. 261; Wt. Ic. t. 210.

N. Circars and Deccan, in hill forests; W. Gháts, from S. Canara to Travancore, up to 3,000 ft.

A large climbing shrub with dark brown rough bark and wood in concentric layers of very porous tissue and bast tissue exuding a red gum. It is very damaging to forest trees. The bark gives a coarse fibre. Vern. *Hind.* Maula; *Ur.* Poráso; *Tam.* Piláccchi valli; *Mal.* Athambu.

2. SPATHOLOBUS PURPUREUS, Benth.; F. B. I. ii. 194.

Travancore, in Aryanad forests (M. Rama Rao).

A large climbing shrub, with papery pods.

42. Canavalia, DC.

Climbing or prostrate herbs. *Leaves* pinnately 3-foliolate; stipules small, sometimes wart-like; stipels subulate. *Flowers* showy, in elongated peduncled axillary racemes, fascicled on a nodose rhachis; bracts minute; bracteoles small, roundish, caducous. *Calyx* campanulate, bilabiate, the upper lip broad, entire or emarginate, the lower smaller, shortly 3-toothed. *Corolla* much exserted; standard large, suborbicular, reflexed; wings narrow, free from and equalling the obtuse incurved keel. *Stamens* monadelphous, the axillary one shortly free at the base; anthers uniform. *Ovary* obscurely stalked; ovules many; style incurved, beardless; stigma terminal, minute. *Pod* large, linear or oblong, compressed or turgid, with a distinct rib on each valve near the dorsal suture. *Seeds* ovate, compressed; hilum linear.

Pods flattened, not turgid:—

Pods 6–12 in. long, 1–1.5 in. broad, seeds 8–12; leaflets ovate, acute

1. *ensiformis*.

Pods 4–6 in. long, .5–1 in. broad, seeds 4–6:—

Racemes many-flowered; climbing herbs with large obovate, acute, or obtuse leaflets2. *virosa*.

Racemes few-flowered; prostrate herbs with rather small, orbicular, obtuse or retuse leaflets3. *lineata*.

Pods turgid, broad, 4–6-seeded, beaked; leaflets ovate, acuminate

4. *obtusifolia*.

1. CANAVALIA ENSIFORMIS, DC.; F. B. I. ii. 195. *C. gladiata*, DC.; W. & A. 253; Wt. Ic. t. 753.

In gardens and on the roofs of huts, cultivated as a vegetable. The Sword-bean.

A climbing bean with pink or white large flowers. Vern.

Hind. Kadsambal; *Tam.* Segapu; *Tel.* Tumbetten kaya.

2. CANAVALIA VIROSA, W. & A. 253. *C. ensiformis* var. *virosa*, Bak. in F. B. I. ii. 196.

In most Districts, especially in the Deccan and Carnatic.

A large climber with lilac flowers and short pods.

Var. *mollis*. *Canavalia mollis*, W. & A. 253. *C. ensiformis* var. *mollis*, Bak. in F. B. I. ii. 196.

W. Gháts, Hills of Mysore, Coimbatore, Nilgiris and Pulneys, at 4,000 to 5,000 ft.

Branches, leaves and calyx more or less densely hairy.

3. *CANAVALIA LINEATA*, DC. *C. obtusifolia*, Bak. in F. B. I. ii. 196.

Coast sands of the Coromandel and lower Malabar coast.

A trailing plant, valuable as a sandbinder (*cf.* Clegh. Madr. Journ. i. t. 4) and rooting at the nodes, often in company with *Ipomaea biloba*, Forsk. Flowers pink or lilac, leaflets rather small and orbicular.

4. *CANAVALIA OBTUSIFOLIA*, DC. *C. ensiformis* var. *turgida*, Bak. in F. B. I. ii. 196.

Banks of canals and backwaters near Quilon in Travancore (K. Venkoba Rao).

A climber, probably biennial, with pink flowers.

43. *Pueraria*, DC.

Climbing shrubs or herbs, sometimes with tuberous roots. *Leaves* pinnately 3-foliolate, the leaflets broadly ovate or rhomboid, sometimes palmately lobed; stipules herbaceous, basifixed or peltate; stipels subulate. *Flowers* purplish or blue, in long often compound axillary racemes, fascicled on the nodose rhachis; bracts small, deciduous; bracteoles small. *Calyx* campanulate, teeth 5, the two upper connate in an entire or 2-lobed lip. *Corolla* exsert; standard obovate or orbicular with auricles above the claw; wings oblong or falcate, equalling the obtuse keel. *Stamens* monadelphous, the axillary one free at the base, sometimes quite free; anthers uniform. *Ovary* subsessile, many-ovuled; style filiform, curved, beardless; stigma capitate. *Pod* linear, more or less flattened, continuous or septate within, sometimes jointed. *Seeds* suborbicular or transversely oblong; hilum oblong; strophiole small or 0.

PUERARIA TUBEROSA, DC.; F. B. I. ii. 197; W. & A. 205, 449; Wt. Ic. t. 412.

Hill forests of the N. Circars, Deccan and W. Gháts, up to about 3,000 ft., down to Travancore, nowhere very common.

A large climber with huge tuberous roots, blue flowers which appear in the hot season when the plant is leafless, large leaflets with cordate peltate stipules and jointed pods up to 3 in. long, covered with long reddish bristly hairs. The

tubers are sometimes eaten. Vern. *Hind.* Tirra; *Tel.* Dari, Gumodi.

44. Phaseolus, Linn.

Herbs, rarely undershrubs, twining or suberect, often prostrate. *Leaves* pinnately 3-foliolate; stipules membranous, lanceolate, basifixed or peltately attached; stipules subulate. *Flowers* in axillary racemes, fascicled on the rhachis; bracts and bracteoles often conspicuous, usually persistent. *Calyx* campanulate, the lowest tooth the longest, the upper two connate or free. *Corolla* exserted; standard orbicular, subauriculate at base; wings obovate, adnate to the keel, often large; keel petals prolonged into a spiral beak. *Stamens* diadelphous; anthers uniform. *Ovary* sessile, many-ovuled; style enclosed in the beak of the keel and twisted with it, conspicuously bearded down the side below the oblique stigma. *Pod* linear or falcate, terete or compressed, more or less septate between the seeds. *Seeds* smooth, the hilum punctate or shortly linear; strophiole 0.

Stipules basifixed; corolla red white or purple, not yellow; leaflets usually entire:—

Pods narrow, subcylindric, almost straight, many-seeded; flowers dull purplish-red 1. *semierectus*.

Pods broad, subcompressed, more or less recurved:—

Racemes dense; flowers large, the standard cream-coloured, the wings purple; pods linear, 10-15-seeded, 4-6 in. long, .4-.5 in. broad 2. *adenanthus*.

Racemes lax:—

Pods few-seeded:—

Flowers small, yellowish-green or dirty white; pods broad and scimitar-shaped, 2-4-seeded *lunatus*.

Flowers medium-sized:—

Racemes shorter than the leaves; flowers lilac to white; pod linear, smooth, .5 in. broad *vulgaris*.

Racemes as long or longer than the leaves; flowers scarlet or white; pod curved, scabrous, 1 in. broad *multiflorus*.

Pods many-seeded, 3-4 in. long, .1-.2 in. broad, bordered; flowers violet-purple, medium-sized 3. *Grahamianus*.

Stipules peltately fixed; corolla yellow:—

Pods glabrous:—

Pods cylindric; leaflets distinctly lobed:—

Stipules ovate or oblong, bracteoles ovate; leaflets 3-lobed, the lobes various in shape.....4. *trilobus*.
 Stipules lanceolate as also bracteoles; leaflets deeply 3-lobed the lobes again variously cut 5. *aconitifolius*.
 Pods more or less compressed; leaflets entire or only obscurely lobed:—

Stems glabrous or nearly so; stipules minute, lanceolate, .15 in. long, glabrous; bracteoles linear, .25 in. long; leaflets ovate, under 2 in. long, often slightly lobed, acute

6. *Dalzellii*.

Stems clothed with stiff deflexed hairs; stipules lanceolate, .2 in. long, hispid; bracteoles linear, .15 in. long; leaflets broadly ovate, 2–4 in. long, scarcely ever lobed, acuminate

7. *calcaratus*.

Pods hirsute, slightly compressed:—

Stems erect; leaves large, leaflets entire or rarely slightly lobed:—

Pods erect or suberect; seeds black..... *Mungo*.

Pods spreading; seeds green *radiatus*.

Stems twining; leaves rather small, leaflets obtuse or acute, the side ones and sometimes the terminal lobed.....8. *sublobatus*.

1. *PHASEOLUS SEMIERECTUS*, Linn.; F. B. I. ii. 201. *P. psoraleoides*, W. & A. 244; Wt. Ic. t. 249.

Carnatic, especially near Madras, a weed of waste land, probably introduced.

An erect herbaceous plant with very narrow pods and many rectangular seeds.

2. *PHASEOLUS ADENANTHUS*, G. F. Mey.; F. B. I. ii. 200. *P. rostratus*, Wall.; W. & A. 244; Wt. Ic. t. 34.

W. Coast, in Malabar and Travancore.

A twining perennial with large showy flowers and flat many-seeded pod. The tuberous root is sometimes eaten.

Vern. *Tam*. Karalsona.

3. *PHASEOLUS GRAHAMIANUS*, W. & A. 244; F. B. I. ii. 201.

W. Gháts, in the Nilgiri, Pulney and Tinnevely Hills, up to 4,000 ft., also Hills of Coimbatore (Fischer).

A slender climber with rather small deltoid leaflets and very narrow, flat, many-seeded pod.

4. *PHASEOLUS TRILOBUS*, Ait.; F. B. I. ii. 201; W. & A. 246 Wt. Ic. t. 94.

All plains Districts, on fallow lands, waste places, river banks and the sea-coast; common.

A diffuse trailing herb, good for fodder and sometimes cultivated for its seeds. Vern. *Hind.* Mugani; *Tel.* Pilli persara; *Tam.* Pani payir.

5. PHASEOLUS ACONITIFOLIUS, Jacq.; F. B. I. ii. 202; W. & A. 247.

Deccan and Carnatic, in similar places to the last, but perhaps not truly wild.

A diffuse trailing plant, cultivated as a fodder crop and for its seeds, in dry sandy lands. Vern. *Hind.* Moth; *Tam.* Tulka payir.

6. PHASEOLUS DALZELLII, T. Cooke. *P. pauciflorus*, Dalz.; F. B. I. ii. 202.

W. Gháts, in the Nilgiri and Pulney Hills (Bourne), at about 3,000 ft.

A slender climber with pale yellow flowers.

7. PHASEOLUS CALCARATUS, Roxb.; F. B. I. ii. 203; W. & A. 245.

W. Gháts, in the Nilgiri, Pulney and Travancore Hills, up to 7,000 ft.

A slender hairy climber with yellow flowers, sometimes cultivated.

8. PHASEOLUS SUBLOBATUS, Roxb. *P. trinervius*, Heyne; F. B. I. ii. 377; W. & A. 245.

Hills of the Deccan and Western Gháts, up to 6,000 ft.

A slender very hairy climber, very variable in its leaves, the stipules large and prominent.

The following species are found in cultivation:—

P. lunatus, Linn., the “Lima Bean.” Cultivated in gardens for its pods and usually white seeds.

P. vulgaris, Linn., the “French Bean” or “Haricot Bean.” Cultivated in gardens for its pods.

P. multiflorus, Willd., the “Scarlet Runner.” Cultivated for its pods, especially in gardens in the hills.

P. radiatus, Linn. Vern. *Hind.* Múng. Cultivated as a crop for its seeds.

P. Mungo, Linn. Vern. *Hind.* Tikari kalai, Urd. Cultivated as a fodder crop and for its seeds, but apparently rare.

45. *Vigna*, Savi.

Twining, rarely suberect, herbs or undershrubs. *Leaves* pinnately 3-foliolate; stipules basifixed or rarely peltate; stipels subulate. *Flowers* in racemes at the end of an axillary peduncle, fascicled on a nodose rhachis; bracts small, deciduous; bracteoles sometimes large and subpersistent. *Calyx* campanulate, the teeth distinct or the 2 upper more or less connate. *Corolla* exserted; standard orbicular, auricled at base; wings obovate falcate, slightly adnate to the keel; keel petals equalling the wings, incurved, acute or if beaked not spirally. *Stamens* diadelphous; anthers uniform. *Ovary* sessile, many-ovuled; style filiform or thickened upwards, longitudinally bearded on the inner face; stigma oblique. *Pod* linear, straight or incurved, usually acuminate, septate between the seeds. *Seeds* reniform or subquadrate, the hilum short, lateral; strophiole 0.

Keel not beaked, a suberect or twining annual with white, pink or yellowish flowers and long glabrous pods with many seeds...*Catjang*

Keel beaked but not spiral as in *Phaseolus*:—

Flowers large, 1 in. or more long; calyx-teeth subequal, about .25 in. long, as long as the tube; leaflets rather small:—

Calyx strigosely hirsute; petals long-clawed; leaflets ovate or lanceolate, acute; pod with nearly black hairs, later glabrous

1. *vexillata*.

Calyx softly villous; petals short-clawed; leaflets ovate, mucronate, subobtusely; pod with pale brown hairs.....2. *Wightii*.

Flowers medium-sized, under .75 in. long:—

Calyx-teeth unequal, the upper pair short, connate, the lowest the longest; keel petals very long-clawed; leaflets large, ovate, acute, the end one deltoid at base; pod densely brown-villous, long-acuminate.....3. *pilosa*.

Calyx-teeth subequal, the upper pair rounded, connate; keel petals short-clawed; leaflets large, ovate, acuminate, densely tawny villous on both sides, the end one deltoid or rounded; pod at first densely villous; afterwards glabrescent...4. *Bourneae*.

1. *VIGNA VEXILLATA*, Benth.; F. B. I. ii. 206. *Phaseolus pulniensis*, Wt. Ic. t. 202.

W. Gháts, in the S. Canara, Nilgiri and Pulney Hills, up to 7,000 ft.

A very pretty climber with large reddish-purple flowers.

Var. *Stocksii*, Benth. Leaflets broadly ovate, often cordate at base, with more abundant brown silky hairs.

Kadur Hills of Mysore, at 5,500 ft. (Talbot).

2. *VIGNA WIGHTII*, Benth.; F. B. I. ii. 206; Bedd. Ic. t. 296.

W. Gháts, in the Wynaad, Coimbatore and Pulney Hills, in grass lands, at about 5,000 ft. "Wynaad Sweet Pea (Beddome)."

Similar to the last, with pink flowers.

3. *VIGNA PILOSA*, Bak. in F. B. I. ii. 207. *Dolichos pilosus*, Roxb.; W. & A. 249.

W. Gháts, in evergreen forests, S. Canara to Travancore, at low levels.

A slender climber with reddish flowers and very long-pointed velvety pods.

4. *VIGNA BOURNEAE*, Gamble in Kew Bull. 1918, ined.

W. Ghats, in the Pulney Hills at low elevations (Bourne).

A stout climber with prominent oblong-lanceolate peltate stipules, very thickly villous branches and leaves and long peduncled very nodose racemes. Flowers larger than those of *V. pilosa* apparently reddish-purple.

Vigna Catjang, Walp. is a suberect annual plant cultivated for its pods, which are eaten like French beans, and for its seeds Vern. *Hind.* Lobia; *Tam.* Karamani.

46. *Clitoria*, Linn.

Herbs or shrubs, erect or climbing. *Leaves* pinnate, 3-many-foliolate; stipules persistent, striate; stipels small, subulate. *Flowers* showy, axillary, solitary fascicled or racemose; bracts persistent, stipule-like; bracteoles usually large, persistent. *Calyx* membranous, tubular, the 2 upper teeth subconnate. *Corolla* much exserted; standard large, erect, emarginate, narrowed at base; wings falcate-oblong, spreading, adnate in the middle to the keel; keel shorter than the wings, incurved, acute. *Stamens* usually diadelphous, the vexillary one sometimes connate with the others; anthers uniform. *Ovary* stipitate, many-ovuled; style elongate, incurved, bearded along the inner side. *Pod* linear-oblong, flattened or turgid, many-seeded. *Seeds* subglobose or compressed; strophiole 0.

CLITORIA TERNATEA, Linn.; F. B. I. ii. 208; W. & A. 205.

Cultivated in gardens everywhere, but also common self-sown in hedges and thickets.

A very pretty climber with large bright blue prominently bracteolate flowers, the standard having an orange centre. Vern *Hind.* Khagin; *Tel.* Nalla-ghentana; *Tam.* Karka kartun.

47. *Dolichos*, Linn.

Twining prostrate or suberect herbs. *Leaves* pinnately 3-foliolate; stipules basifixed, subpersistent; stipels subulate. *Flowers* in axillary racemes or fascicles or solitary; bracts and bracteoles minute, striate, subpersistent. *Calyx*-tube campanulate, the teeth short or long, the 2 upper connate. *Corolla* exserted; standard orbicular, auricled at base and with projecting appendages above the claw; wings oblong or obovate, slightly adnate to the keel; keel much incurved, usually with a straight beak. *Stamens* diadelphous; anthers uniform. *Ovary* subsessile, many-ovuled; style thickened upwards and bearded down the inner face or filiform and bearded round the terminal stigma. *Pod* flat, linear or oblong, recurved, usually tipped with the persistent style. *Seeds* thick or somewhat flattened, hilum short with slender funicle or elongate with thickened subpersistent funicle.

Style thickened upwards, bearded down the inner edge; large climbing herbs with elongate racemes on tumid nodes *Lablab*.

Style filiform, bearded only round the stigma; nodes not tumid:—

Twining herbs with tuberous roots, perennial:—

Flowers about 2–8, lilac or pink, on slender peduncles varying up to 2 in. long; calyx-teeth short; leaflets broadly deltoid-ovate, the end one often 3-lobed; pod linear, glabrous, 2–3 in. long, .35 in. broad, 6–8-seeded 1. *falcatus*.

Flowers about 3–6, yellow, in short cymes under .5 in. long, the petals striate; calyx-teeth long; leaflets elliptic-ovate, obtuse, prominently ciliate on the margins; pod linear-oblong, glabrous, 1–1.5 in. long, .4–.5 in. broad, 3–4-seeded 2. *ciliatus*.

Erect or somewhat twining herbs, the roots not tuberous, annual; flowers 1–3 together in leaf-axils, yellow, softly hairy, wings narrow; calyx-teeth setaceous; leaflets ovate, acute; pod linear, 1.5–2 in. long, .25 in. broad, 5–6-seeded *biflorus*.

1. *DOLICHOS FALCATUS*, Klein; F. B. I. ii. 211; W. & A. 249.

All Districts, and up to 6,000 ft. in the hills.

A slender twiner with pretty lilac or pink flowers.

2. *DOLICHOS CILIATUS*, Klein; F. B. I. ii. 210; W. & A. 249.

Carnatic, chiefly near the coast, common about Madras.

A slender twiner with ciliate leaflets.

Dolichos Lablab, Linn. is cultivated in gardens and on sheds for its pods, which are eaten like French beans. There are two varieties, distinguished by their pods, var. *typicus*, Prain, with rather long narrow pods and seeds with the long axis parallel to the sutures, and var. *lignosus*, Prain, with shorter broader pods and seeds with the long axis at right angles to sutures. The latter seems the most common in Madras. Vern. *Hind.* Sem; *Tam.* Avarai; *Tel.* Alsunda.

Dolichos biflorus, Linn., is the "Horse Gram," largely cultivated, especially in the Circars and Deccan, on poor soils, for its seeds and as a fodder crop for horses and cattle. Vern. *Hind.* Kulti; *Tam.* Kollu; *Tel.* Wulawala; *Kan.* Hurali.

48. *Atylosia*, W. & A.

Herbs or shrubs, erect or twining. *Leaves* pinnately or rarely digitately 3-foliolate; leaflets with resinous glands beneath; stipules lanceolate or setaceous; stipels small or 0. *Flowers* usually yellow, axillary, in pairs or racemes; bracts usually broad, membranous, deciduous; bracteoles 0. *Calyx*-tube campanulate, the lobes distinct, the lowest the longest, the two upper connate in an entire or bifid lip. *Corolla* more or less exserted, sometimes marcescent; standard orbicular, auricled at base; wings obliquely obovate or oblong; keel slightly curved, obtuse. *Stamens* diadelphous; anthers uniform. *Ovary* sessile, ovules 3 or more; style filiform, incurved, glabrous; stigma capitate. *Pod* linear or oblong, septate within, the valves more or less transversely or obliquely depressed between the seeds. *Seeds* ovate or orbicular with a conspicuous strophiole.

Erect shrubs; flowers in pairs; pod not prominently depressed between the seeds:—

Flowers large, peduncled; leaflets thick, obovate or oblanceolate, up to 3 in. long, densely brown-silky-pubescent beneath; pod oblong, brown-silky, 1-1.5 in. long by .5 in. broad, 3-4-seeded

1. *trinervia*.

Flowers small, under .5 in. long, not peduncled:—

Leaflets thin, obovate or oblanceolate, up to 1.5 in. long, grey-

silky-pubescent beneath; pod oblong, .5-.75 in. long by .25 in. broad, thinly grey-silky, 2-3-seeded..... 2. *lineata*.
 Leaflets thick, linear-oblongate, up to 1.5 in. long, densely white-silky-pubescent; pod small, white-silky, .5 in. long by .25 in. broad, 2-seeded..... 3. *sericea*.

Climbing shrubs; pod distinctly depressed between the seeds:—

Flowers in lax rather stout racemes; depressions of pod oblique; leaflets stipellate:—

Petals exserted, marcescent; bracts large, elliptic, conspicuous in season of bud, then deciduous; leaflets coriaceous, densely grey-pubescent beneath..... 4. *volubilis*.

Petals included, not marcescent; bracts ovate cuspidate, deciduous; leaflets chartaceous, thinly pubescent beneath..... 5. *goensis*.

Flowers in slender short racemes; depressions of pod straight or slightly oblique; leaflets exstipellate:—

Calyx-teeth short; pod more than 1 in. long, 5-7-seeded, thinly white-hoary; leaflets broadly obovate, obtuse, grey-canescens

6. *albicans*.

Calyx-teeth long; pod under 1 in. long, with brown hairs:—

Leaflets broadly obovate, rugose above, prominently reticulate beneath and white-canescens; pod 3-4-seeded, shortly villous, the apex hooked..... 7. *rugosa*.

Leaflets obovate-oblong, only slightly rugose and reticulate, slightly grey-canescens beneath; pod 4-6-seeded with golden spreading hairs, the apex straight..... 8. *scarabaeoides*

1. *ATYLOSIA TRINERVIA*, Gamble n. comb. *A. Candollei*, W. & A. 257; F. B. I. ii. 212; Wt. Ic. t. 754.

W. Gháts, in the Nilgiri Hills, above 5,000 ft., Hills of Travancore, at 7,000 ft.

A handsome shrub with bright yellow flowers.

Var. *major*, Prain. *A. major*, W. & A. 257. Flowers larger, on longer peduncles; leaflets larger and more silky as are the branchlets.

W. Gháts, in the Nilgiri Hills, about 6,000 ft.; Atapadi Hills of Malabar, at 5,500 ft. (Fischer).

2. *ATYLOSIA LINEATA*, W. & A. 258; F. B. I. ii. 213. *A. Lawii*, Wt. Ic. t. 93.

W. Gháts, from S. Canara and Mysore to Travancore, at 3,000 to 5,000 ft.

A compact ashy-grey bush with yellow flowers.

3. ATYLOSIA SERICEA, Benth.; F. B. I. ii. 213.

E. Gháts, in the Hills of Vizagapatam, at 4,000 ft. and higher (A. W. Lushington).

An erect white silky shrub with red flowers.

4. ATYLOSIA VOLUBILIS, Gamble n. comb. *A. crassa*, Prain in Journ. As. Soc. Beng. lxvi, 45. *A. mollis*, Benth.; F. B. I. ii. 213 in part. *Cytisus volubilis*, Blanco.

E. Gháts, in the Hills of Ganjam and Vizagapatam, up to 3,000 ft.

A climbing shrub with densely rusty tomentose foliage and yellow flowers.

5. ATYLOSIA GOENSIS, Dalz. *A. barbata*, Bak. in F. B. I. ii. 216.

W. Gháts, from S. Canara to Travancore, at low elevations and up to 3,500 ft.

A climbing grey-pubescent shrub with yellow flowers.

6. ATYLOSIA ALBICANS, Benth.; F. B. I. ii. 215. *Cantharospermum albicans*, W. & A. 256 in part.

E. Gháts, Hills of Vizagapatam, at 1,500 ft.; Hills of W. Deccan; W. Gháts from Mysore to Travancore, up to 5,000 ft., usually in somewhat dry localities.

A climbing shrub easily known by its bluish grey striate stems and leaflets. Flowers yellow.

7. ATYLOSIA RUGOSA, W. & A. 257; F. B. I. ii. 215.

W. Gháts, in the Nilgiri, Anamalai and Pulney Hills, from 5,000 to 7,000 ft.; Shevaroy Hills of Salem.

A climbing shrub with reticulate leaflets grey-canescant beneath, and yellow flowers.

8. ATYLOSIA SCARABAEOIDES, Benth.; F. B. I. ii. 215. *Cantharospermum pauciflorum*, W. & A. 255.

N. Circars, from Ganjam to Godavari; Deccan, in Mysore and Coimbatore; W. Gháts, at low levels on the E. side, from Nilgiris to Cape Comorin.

A slender twining shrub with softly golden-villous pods and yellow flowers.

Cajanus indicus, Spreng., is the "Pigeon pea"—an erect shrub with corolla yellow or yellow veined with red, cultivated for its seeds especially in forest regions. The leaves are used for cattle-fodder. Vern. *Hind.* Arhar dál; *Tam.* Tuvarai; *Tel.* Kandalu.

49. *Dunbaria*, W. & A.

Prostrate or twining woody herbs. *Leaves* pinnately 3-foliate, glandular beneath; stipules setaceous or lanceolate; stipels small or 0. *Flowers* in axillary peduncled racemes, solitary or paired on the rhachis; bracts membranous, usually broadly ovate, very early deciduous; bracteoles 0. *Calyx*-tube campanulate, the teeth lanceolate or triangular, the lowest the longest, the 2 upper ones connate in an entire or bifid lobe. *Corolla* exserted, sometimes marcescent; standard obovate or orbicular with auricles at the base and 2 callosities above it; wings obliquely obovate or oblong, auricled; keel petals incurved, obtuse. *Stamens* diadelphous; anthers uniform. *Ovary* sessile or shortly stipitate, many-ovuled; style inflexed, filiform or thickened, beardless; stigma capitate. *Pod* oblong, compressed, subseptate within, not depressed between the seeds outside. *Seeds* suborbicular, the funicle expanded but scarcely strophiolate.

Corolla large, marcescent:—

Stems and leaves tawny-pubescent, the leaflets thick, broadly ovate, acute or acuminate; stipels generally 0; calyx-lobes lanceolate; standard over 1 in. long, emarginate; pod softly tawny-pubescent

1. *ferruginea*.

Stems and leaves with scattered strigose hairs, the leaflets thin, end one obovate, side ones unequally lanceolate, all acuminate; stipels present; calyx-lobes short except the lowest; standard .75 in. long, obtuse; pod with long villous hairs 2. *Heynei*.

1. *DUNBARIA FERRUGINEA*, W. & A. 258; F. B. I. ii. 217.

D. latifolia, W. & A. 258.

Deccan, Hills of Cuddapah and N. Coimbatore; W. Gháts, in the Nilgiri, Pulney and Travancore Hills, up to 3,000 ft. A stout climber with large yellow flowers.

2. *DUNBARIA HEYNEI*, W. & A. 258; F. B. I. ii. 217.

W. Gháts, in Mysore, Wynaad and the Anamalais, up to 3,000 ft.

A climber with yellow flowers; stipules and stipels prominent.

50. *Cylista*, Ait.

A twining shrub. *Leaves* pinnately 3-foliate, with resinous glands beneath; leaflets ovate or rhomboidal, acuminate; stipules

lanceolate, deciduous; stipels subulate. *Flowers* in axillary sometimes paniced racemes; bracts lanceolate, acuminate, membranous, caducous; bracteoles 0. *Calyx*-tube campanulate, lobes obtuse scarious, accrescent, persistent, the lowest the largest and boat-shaped, the upper 2 connate in an emarginate lip, the 2 lateral shorter. *Corolla* included; standard suborbicular, auricled at base with 2 callosities above it; wings narrow, auricled; keel incurved, obtuse. *Stamens* diadelphous, anthers uniform. *Ovary* subsessile, 1-ovuled; style long, filiform; stigma terminal, capitate. *Pod* small, oblique, enclosed in the calyx. *Seed* 1, oblong, not strophiolate.

CYLISTA SCARIOSA, Roxb. Cor. Pl. t. 92; F. B. I. ii. 219; W. & A. 259; Wt. Ic. t. 1597.

N. Circars, common in the open forests from Ganjam to Godavari at low levels; Deccan, in Kurnool and Mysore; Carnatic, in Tinnevely.

A climber with yellow flowers concealed in a prominent accrescent calyx, the leaflets reticulate beneath and softly pubescent.

51. Rhynchosia, Lour.

Twining or erect herbs or shrubs. *Leaves* pinnately or sometimes subdigitately 3-foliolate; stipules ovate or lanceolate; stipels subulate or minute or 0. *Flowers* in axillary racemes, solitary or in pairs on the rhachis, rarely solitary; bracts usually caducous; bracteoles 0. *Calyx*-tube short, lobes subequal, the 2 upper more or less connate, not or only slightly accrescent. *Corolla* included or exerted; standard obovate or orbicular with inflexed auricles at the base; wings narrow; keel incurved, hardly beaked. *Stamens* diadelphous; anthers uniform. *Ovary* subsessile, usually 2- rarely 1-ovuled; style long, filiform, much incurved; stigma capitate. *Pod* round or oblong, more or less compressed, continuous or septate within. *Seeds* 2, rarely 1, subreniform; strophiole present or absent.

Seeds strophiolate:—

Calyx conspicuous, accrescent; leaflets ovate, acute; flowers in lax racemes:—

Calyx-lobes oblong, obtuse; bracts ovate; pod as long as broad, pointed, 1-seeded1. *rufescens*.

Calyx-lobes lanceolate, acute; bracts cordate; pod twice as long as broad, 2-seeded.....2. *Heynei*.

Calyx not accrescent :—

Calyx-lobes linear, the lowest longest; leaflets obtuse; trailing undershrubs or herbs :—

Pod 1-seeded, orbicular, with few branching transverse veins; flowers small, in elongate racemes; leaflets broadly ovate-cuneate, the end one truncate or emarginate, 1-2 in. in diam.

3. *nummularia*.

Pod 2-seeded; flowers moderate-sized :—

Flowers in racemes; pod with close transverse wrinkles on the faces :—

Racemes few-flowered, the peduncle shorter than the leaves, naked; standard yellow striped with purple; leaflets suborbicular, deltoid, 3-4 in. in diameter

4. *aurea*.

Racemes many-flowered, capitate, the peduncle longer than the leaves with a slender leafless shoot near the middle; standard yellow, not striped; leaflets orbicular-ovate, deltoid, up to 2 in. in diam.....5. *capitata*.

Flowers solitary on thread-like pedicels with bracts a short way below the calyx; leaflets coriaceous, obovate, white-velvety beneath and reticulate, mucronate, up to 2.5 in. long; pod oblong, .5 in. long, softly pubescent, not wrinkled on the faces6. *filipes*.

Calyx-lobes lanceolate, acuminate, nearly equal; leaflets acute; erect undershrubs with 2-flowered axillary peduncles; seeds 2 :—

Viscous-pubescent, yellowish when dry; pod indented without between the seeds and with a partition within; leaflets ovate acuminate, up to 3 in. long.....7. *suaveolens*.

Glandular-pubescent but not viscous, greyish-green when dry; pod slightly indented without between the seeds but with no partition within; leaflets ovate acute or almost obtuse, up to 2 in. long.....8. *cana*.

Calyx-lobes oblong, obtuse, longer than the corolla, the lowest shortest; erect undershrub with white-silky, coriaceous, reticulate, ovate or lanceolate leaflets up to 1.25 in. long; flowers in short racemes; pod suborbicular, 2-3 in. in diam., seed 1

9. *Beddomei*.

Seeds estrophiolate :—

Calyx-lobes large, foliaceous, .75 in. long; flowers large, in long racemes with large ovate-cuspidate deciduous bracts; pod as long as the calyx, densely velvety, with 2 blue-black seeds

10. *cyanosperma*.

Calyx-lobes acuminate, not foliaceous:—

Leaflets small, usually obtuse, under 1·5 in. in diam.:—

Racemes slender, lax, 1–3 in. long; flowers small, ·2 in. long; pod ·5–·6 in. long, ·2 in. broad, nearly glabrous, slightly curved

11. *minima*.

Racemes short, cymose, about ·5 in. long; flowers larger, ·5 in. long; pod 1–1·25 in. long, ·4 in. broad, slightly puberulous, much curved.....12. *velutina*.

Leaflets moderately large to large, acute or acuminate, at any rate over 1 in. in diam. even at the ends of the branchlets:—

Flowers in more or less lax racemes; pod much longer than the calyx, tipped with the persistent base of the style:—

Pod acute at apex below the base of the style:—

Pod with bulbous-based setose hairs, as well as pubescence:—

Corolla yellow; pubescence glandular; leaflets broadly deltoid, shortly acuminate, rarely over 3 in. long; bracts minute, deciduous; pod sparsely pubescent

13. *viscosa*.

Corolla purple; pubescence silky; leaflets broadly ovate, acute, the end one rhomboid, usually over 3 in. long; bracts lanceolate, subpersistent; pod tawny-villous

14. *sericea*.

Pod softly grey-tomentose without setose hairs; corolla yellow veined with red; pubescence very short, fulvous; leaflets rhomboid-ovate, very long acuminate, 3–5 in. long

15. *acutissima*.

Pod obtuse at apex below the curved style, minutely pubescent; corolla yellow; pubescence softly fulvous; bracts lanceolate, deciduous; leaflets deltoid, shortly acuminate, coriaceous, up to 4 in. long16. *bracteata*.

Flowers in dense almost capitate racemes; pod only slightly longer than the calyx, acute at tip, slightly villous; calyx-lobes lanceolate, acuminate, silky-villous and dotted with red glands bracts lanceolate, persistent; leaflets rhomboid ovate, acute, membranous, 1–2 in. long17. *densiflora*.

1. RHYNCHOSIA RUFESCENS, DC.; F. B. I. ii. 220; W. & A. 239.
N. Circars, from Ganjam to Godavari, at low levels Deccan, in Mysore and Bellary; Carnatic, dry hills of S. Arcot and Chingleput; W. Gháts, in N. Nilgiris, E. Anamalais and Pulneys, up to 3,000 ft.

An erect shrub with trailing branches, yellow flowers and conspicuous calyx hiding the flowers and pod.

2. *RHYNCHOSIA HEYNEI*, W. & A. 240; F. B. I. ii. 220.
R. codoorensis, Bedd. Ic. t. 297.

Deccan, in Mysore, Cuddapah and Bellary, in hilly country.
A herbaceous trailing undershrub with yellow flowers.

3. *RHYNCHOSIA NUMMULARIA*, DC.; F. B. I. ii. 221. *Nomis-*
mia nummularia, W. & A. 237; Wt. Ic. t. 283.

Carnatic, in Tinnevely, also Shevaroy Hills of Salem.

A trailing annual herb.

4. *RHYNCHOSIA AUREA*, DC.; F. B. I. ii. 221 *in part*. *Nomis-*
mia aurea, W. & A. 237.

Carnatic, not uncommon near Madras; Deccan, in Coimbatore.

A slender trailing annual herb.

5. *RHYNCHOSIA CAPITATA*, DC. *R. aurea*, DC.; F. B. I. ii. 221 *in part*. *Nomismia capitata*, W. & A. 237; Wt. Ic. t. 295.

Deccan, in the Hills of Cuddapah, Anantapur and Coimbatore, up to 1,500 ft.; E. Coast, at Masulipatam (Bourne).

A slender climber with flowers in many-flowered heads, softly villous.

6. *RHYNCHOSIA FILIPES*, Benth.; F. B. I. ii. 221.

W. Gháts, in the Nilgiri and Pulney Hills, at low levels; Shevaroy Hills of Salem.

A slender wide-trailing undershrub with filiform stems and peduncles.

7. *RHYNCHOSIA SUAVEOLENS*, DC.; F. B. I. ii. 221; W. & A. 240.

Deccan and Carnatic, in dry forest localities, up to 3,000 ft. in Coimbatore.

A viscous hairy undershrub with yellow flowers.

8. *RHYNCHOSIA CANA*, DC.; F. B. I. ii. 222; W. & A. 240.

Deccan and Carnatic, in dry forest localities from the Godavari southwards, up to 4,000 ft.; W. Gháts, in the Nilgiri, Pulney and Travancore Hills, up to 5,000 ft.

A glandular undershrub with yellow flowers.

9. *RHYNCHOSIA BEDDOMEI*, Bak. in F. B. I. ii. 222.

Deccan, on rocks on Horsleykonda, at 4,000 ft., and other hills in Cuddapah and Bellary.

A stiff undershrub with bright yellow flowers.

10. *RHYNCHOSIA* *CYANOSPERMA*, Benth.; F. B. I. ii. 222. *Cyanospermum tomentosum*, W. & A. 260; Wt. Ill. t. 81. *Cylista tomentosa*, Roxb. Cor. Pl. t. 221.
N. Circars, in the Hills of Vizagapatam, at 4,500 ft.; W. Gháts, from S. Canara and Mysore to Travancore, up to 4,000 ft.
A stout woody climber with large velvety leaves and red yellow or white flowers, the 2 seeds blue-black.
11. *RHYNCHOSIA* *MINIMA*, DC.; F. B. I. ii. 223. *R. medicaginea*, DC. and *R. nuda*, DC.; W. & A. 238.
Circars, Deccan and Carnatic and westwards to the foot of the Gháts, in dry places.
A slender trailing annual with small obtuse leaflets and small yellow flowers.
Var. *laxiflora*, Bak. in F. B. I. ii. 223. Leaflets larger and acute at apex; racemes longer and laxer.
Circars and Deccan.
12. *RHYNCHOSIA* *VELUTINA*, W. & A. 238; F. B. I. ii. 224.
Fort St. George (Bulkeley, 1,700); Tanjore and Tinnevely (Wight).
A wide trailing herb with suborbicular leaflets, grey-canescient beneath.
13. *RHYNCHOSIA* *VISCOSA*, DC.; F. B. I. ii. 225. *Dolichos glutinosus*, W. & A. 248.
Deccan, Hills of Kurnool; W. Gháts, Bolampatti Valley in Coimbatore and Lower Pulneys, up to 1,500 ft.; Shevaroy Hills of Salem.
A climber with glandular branches and yellow flowers.
14. *RHYNCHOSIA* *SERICEA*, Span.; F. B. I. ii. 225. *Dolichos tomentosus*, W. & A. 248.
Deccan, Kondapalle in Kistna; W. Gháts, from Mysore to the Pulney Hills, up to 4,000 ft.
A climbing shrub with soft silky pubescence and long racemes of purple flowers.
15. *RHYNCHOSIA* *ACUTISSIMA*, Thw.; F. B. I. ii. 226.
Evergreen forests of the low country of Travancore (Beddome, Rama Rao).
A slender climber with pale brown tomentum and long acuminate leaflets.

16. *RHYNCHOSIA BRACTEATA*, Benth. ; F. B. I. ii. 225.

Deccan, Mantralakanama Pass in Kurnool, 2,000 ft. (Gamble).

A rather stiff climber with tawny pubescence and yellow flowers.

17. *RHYNCHOSIA DENSIFLORA*, DC. ; F. B. I. ii. 226 ; W. & A. 239.

W. Gháts, in the Nilgiris, Anamalais and Pulneys, up to 5,000 ft.

A slender twiner, softly villous, with yellow flowers, the standard often streaked with red.

52. *Flemingia*, Roxb.

Shrubs or undershrubs, rarely herbs, erect or trailing. *Leaves* 1-foliolate or digitately 3-foliolate ; stipules striate, often deciduous ; stipels 0. *Flowers* in axillary or terminal simple or compound racemes panicles or sometimes heads ; bracts foliaceous or scarious, persistent or caducous ; bracteoles 0 or minute. *Calyx*-tube short, teeth subequal or the lowest the longest, usually lanceolate. *Corolla* little or not exerted ; standard obovate or orbicular, auricled at base ; wings obliquely oblong or obovate, sometimes short, adnate to the obtuse or slightly rostrate keel. *Stamens* diadelphous, anthers uniform. *Ovary* subsessile, short, 2-ovuled ; style filiform or thickened above ; stigma capitate. *Pod* small, oblique, turgid, usually 2-seeded. *Seeds* suborbicular, estrophiolate.

Leaves unifoliolate ; flowers in axillary and terminal distichous racemes of small cymes, each of which is hidden within a large folded persistent cordate floral leaf, the cymes with many bracteoles :—

Leaflet lanceolate ; flowers 2-3 in. long ; rhachis of inflorescence flexuose :—

Branchlets terete ; floral leaves up to 1 in. long, glabrescent, usually very shortly cuspidate ; lateral nerves of leaflets close, usually more than 8 pairs 1. *strobilifera*.

Branchlets angular ; floral leaves up to 75 in. long, softly hirsute, usually emarginate ; lateral nerves of leaflets distant, usually less than 6 pairs 2. *bracteata*.

Leaflet orbicular, cordate, cuspidate, 2-4 in. in diam. ; flowers

·3-·4 in. long; floral leaves much broader than long, deeply emarginate; rhachis of inflorescence straight 3. *Chapparr.*
Leaves 3-foliolate:—

Flowers very small, in lax panicles of racemes; leaflets oblanceolate, cuneate, plicate, with strong oblique nerves, 1·5-2·5 in. long; pods oblong, glandular-pubescent, under ·5 in. long.....4. *lineata.*

Flowers fairly large, in subspicate axillary racemes; erect shrubs with scariose bracts and 3-ribbed leaflets:—

Branches prominently triquetrous; bracts linear-lanceolate, ·5-·75 in. long, much exceeding the buds; leaflets oblong-lanceolate, up to 1 ft. long, the ribs not very distinguishable from the other nerves; calyx-lobes white-silky, not glandular, short, the lowest the longest.....5. *stricta.*

Branches terete or slightly triquetrous; bracts not exceeding the buds; calyx-lobes linear, elongate; leaflet ribs prominent:—

Leaflets thin, acuminate, glabrous except on the nerves beneath:—

Racemes short, 1·5-2·5 in. long; calyx-lobes white-silky, prominently dotted with black glands as is the almost glabrous under-surface of the leaflets; petiole not or only slightly winged 6. *congesta.*

Racemes long, up to 4 or even 6 in.; calyx-lobes tawny-silky, without glands; under-surface of leaflets villous on the nerves, not or only slightly glandular; petiole winged

7. *semialata.*

Leaflets thick, acute or obtuse, pubescent or tomentose beneath:—

Calyx-lobes and pod densely covered with red glands (black when dry):—

Leaflets obovate, obtuse or subacute, reticulate, grey- or tawny-silky beneath..... 8. *Grahamiana.*

Leaflets oblanceolate, acuminate, densely softly golden-villous beneath..... 9. *Wightiana.*

Calyx-lobes covered with hairs springing from yellow glands; pods not glandular; leaflets small, strongly ribbed and nerved and reticulate 10. *Wallichii.*

Flowers in capitate terminal heads; trailing herbs with small ovate acute leaflets; calyx-lobes with hairs on yellow bulbous bases; pod very small, membranous, 1-seeded 11. *nilgheriensis.*

1. FLEMINGIA STROBILIFERA, R. Br.; F. B. I. ii. 227 *excl. vars.*; W. & A. 243; Wt. Ic. t. 267.

E. Gháts, Hills of Vizagapatam; Deccan, Hills of Kurnool; W. Gháts, Mysore to Malabar and Travancore, up to 3,000 ft.

An erect branching shrub, 4–6 ft. high with white flowers.

2. *FLEMINGIA BRACTEATA*, Wt. Ic. t. 268. *F. strobilifera* var. *bracteata*, Bak. in F. B. I. ii. 227.

W. Gháts, in the Nilgiris, Anamalais and Hills of Malabar, up to 4,000 ft.; Shevaroy Hills of Salem.

An erect branching shrub, 1–3 ft. high, with pink or purple flowers.

3. *FLEMINGIA CHAPPAR*, Ham.; F. B. I. ii. 227.

N. Circars, Sál forests of Ganjam at low levels (Gamble).

An erect shrub with conspicuous floral leaves and white flowers, often gregarious.

4. *FLEMINGIA LINEATA*, Roxb.; F. B. I. ii. 228; W. & A. 242; Wt. Ic. t. 327.

E. Gháts, in the forests of the Upper Godavari (Gamble); W. Gháts, Nilgiri Hills, *vide* DC.

A small erect shrub, with small pinkish flowers.

5. *FLEMINGIA STRICTA*, Roxb. Cor. Pl. t. 248; F. B. I. ii. 228; W. & A. 241; Wt. Ic. t. 329.

E. Gháts, in hill forests from Ganjam to Godavari, up to 2,000 ft.

A tall shrub with triquetrous branches, very large stipules and bracts, and flowers striped with pink, yellow and violet. Vern. *Tel.* Guidda.

6. *FLEMINGIA CONGESTA*, Roxb.; F. B. I. ii. 228; W. & A. 241; Wt. Ic. t. 390.

N. Circars, Sál forests of Ganjam; Deccan, in Mysore.

An erect shrub, 4 ft. high or higher; flowers streaked with purple and yellow.

7. *FLEMINGIA SEMIALATA*, Roxb. Cor. Pl. t. 249; W. & A. 241; Wt. Ic. t. 326. *F. congesta* var. *semialata*, Bak. in F. B. I. ii. 229.

N. Circars, Hills of Vizagapatam; W. Gháts, in Malabar, Coimbatore, Cochin and Travancore, up to 5,000 ft.

An erect shrub; flowers pink with purple and orange streaks.

8. *FLEMINGIA GRAHAMIANA*, W. & A. 242; F. B. I. ii. 228.

W. Gháts, in the Nilgiri, Anamalai and Pulney Hills and the Hills of Travancore, 4,000 to 7,000 ft.

An erect shrub with red, sticky glands which give a dye (Waras); flowers pink.

9. FLEMINGIA WIGHTIANA, Grah.; W. & A. 242. *F. congesta* var. *Wightiana*, Bak. in F. B. I. ii. 229.

N. Circars, Mahendragiri Hill, Ganjam, at 4,000 ft.; W. Gháts, in the Nilgiri, Pulney and Tinnevely Hills, in dry localities at low levels; Shevaroy Hills in Salem.

An erect shrub, densely golden-silky, close to *F. Grahamiana*, but much less glandular.

10. FLEMINGIA WALLICHII, W. & A. 242; F. B. I. ii. 229.

W. Gháts, in Wynaad and Coimbatore, up to 4,000 ft.

An erect shrub with yellow glands and small reticulate leaflets.

11. FLEMINGIA NILGHERIENSIS, Wight. *F. vestita* var. *nilgheriensis*, Bak. in F. B. I. ii. 230. *F. procumbens*, Wt. Ic. t. 987.

W. Gháts, from the Bababudan Hills of Mysore to the Nilgiris and Pulneys, at 4,000 to 7,000 ft.

A trailing plant with many yellow glands and purple flowers.

53. Dalbergia, Linn. f.

Trees or shrubs, often climbing. *Leaves* alternate, imparipinnate or rarely 1-foliolate; leaflets alternate, usually 5 or more; stipules usually small, deciduous; stipels 0. *Flowers* small, usually numerous, in simple or paniced axillary or terminal cymes; bracts small, subpersistent; bracteoles 2, usually small and deciduous. *Calyx* campanulate; teeth short, distinct, the lowest usually longest. *Corolla* exserted; standard ovate obovate or orbicular; wings oblong, free; keel obtuse, the petals joined at the tip. *Stamens* monadelphous (9 or 10) or isodadelphous (5 and 5), rarely diadelphous (9 and 1), anthers minute, the cells back to back, dehiscing apically. *Ovary* stalked; ovules few; style incurved, short, beardless; stigma small, capitate. *Pod* indehiscent, samaroid and compressed, sometimes thickened, usually reticulate opposite the seed. *Seeds* 1-4, reniform, compressed; hilum small.

Standard erect, wings cuneate, rarely truncate or subhastate at base, keel petals cuneate or hastate; style thick, cylindric, usually short; stamens usually monadelphous:—

Flowers minute ; bracteoles usually persistent ; inflorescence dichotomously cymose ; small, erect or climbing shrubs :—

Pod thickened, reniform-falcate ; branchlets ending in spines ; flowers in axillary racemes ; leaflets 5-9, 4-7 in. long, obovate, obtuse or retuse ; seeds 1, rarely 21. *spinosa*.

Pod samaroid ; flowers in axillary cymose panicles :—

Pod pubescent, broadly oblong ; stem armed, branchlets unarmed ; leaflets 11-15, 2-6 in. long, elliptic-oblong, emarginate ; seeds 1, rarely 2 or 3 2. *multiflora*.

Pod glabrous, narrowly ovate ; branchlets ending in spines ; leaflets 7-11, 3 in. long, elliptic, obtuse or retuse ; pod ovate, acute at both ends, seed 13. *coromandeliana*.

Flowers small ; bracteoles deciduous ; inflorescence cymosely paniculate ; leaflets few, suborbicular, cuspidate ; pod narrowly ligulate, 1-2- or rarely 3-seeded ; tree*Sissoo*.

Standard refract or reflexed, wings hastate or sagittate at base, keel petals hastate, style slender ; stamens variously arranged :—

All petals with a slender claw ; stamens usually monadelphous ; standard refract ; climbing shrubs :—

Pod thickened, reniform-falcate ; leaflets 5-7, emarginate, under 1 in. long ; bracteoles obtuse.....4. *canadenensis*.

Pod samaroid, broadly ligulate ; leaflets 3-5 or fewer, abruptly cuspidate and retuse at apex, up to 4 in. long, 2 in. broad ; bracteoles subulate 5. *rostrata*.

Pod samaroid, oblong, netted-veined ; leaflets 3-5, obtuse or emarginate at apex, up to 2.5 in. long, 1.25 in. wide ; bracteoles obtuse6. *rubiginosa*.

Pod samaroid, ovate :—

Leaflets 5-11, cuneate at base, retuse at apex, .75-1.75 in. long, prominently nerved, ferruginous-pubescent beneath when young ; pod smooth but reticulate opposite the seeds, shortly stalked7. *congesta*.

Leaflets rounded at base and apex, obscurely nerved :—

Leaflets 7-11, .5-.75 in. long, shining above, densely rusty-tomentose beneath ; stalk of pod .25 in. long...8. *Gardneriana*.

Leaflets 21-31, .5 in. long, elliptic-oblong, rusty-pubescent beneath ; pod with .75 in. filiform stalk.....9. *malabarica*.

Pod samaroid, narrowly ligulate ; leaflets very many, small, .6-.8 in. long, .25 in. wide, linear-oblong, obtuse ; pod long-stipitate10. *acaciaefolia*.

All petals except the cuneate standard with a slender claw, standard reflexed :—

Stamens usually monadelphous, 9 or 10; trees :—

Flowers in corymbose panicles fascicled on old wood below the upper leaves or in the axils of older leaves; leaflets orbicular, obtuse or emarginate, curved to the petiole at base; pod usually obtuse at apex with a minute apicule, 7 in. broad; young leaves green 11. *latifolia*.

Flowers in loose single panicles terminal or axillary to leaves of new shoots; leaflets obovate acute, rarely suborbicular or obtuse, more or less cuneate at base; pod acute at apex with a longish apicule, 5 in. broad; young leaves yellowish

12. *sissoides*.

Stamens isodiadelphous, 5 and 5 :—

Standard narrow, obovate-oblong, slightly auricled at base with a rather long claw and not thickened above it; flowers in dense panicles; leaflets 9–13, elliptic, retuse, nerves not prominent; pod short-stipitate, coriaceous, narrowed at both ends, 1–2-seeded; tree 13. *paniculata*.

Standard broad, obovate, thickened above the very short claw :—

Tree; leaflets 7–11, ovate-oblong, rarely suborbicular, nerves usually prominent; flowers in loose panicles; pod long-stipitate, oblong, tapering to both ends, 1–3-seeded

14. *lanceolaria*.

Climbing shrub; leaflets 11–13, obovate- or ovate-oblong, obtuse, mucronulate, nerves fairly prominent; pod short-stipitate, oblong, obtuse at apex, 1- rarely 2-seeded

15. *volubilis*.

1. DALBERGIA SPINOSA, Roxb.; F. B. I. ii. 238; Prain Ann. Calc. x. 35, t. 9.

Coast forests of S. Arcot (Wooldridge); Tuticorin (Wight). A stiff, often climbing shrub with whitish small flowers. Bark blackish-grey, rough; wood in alternate layers of wood and bark tissue.

2. DALBERGIA MULTIFLORA, Heyne; Prain Ann. Calc. x. t. 18. *D. sympathetica*, Nimmo; F. B. I. ii. 234.

W. Gháts, lower hills from S. Canara to Travancore and Tinnevely.

A large climbing shrub, often with curiously twisted branches bearing spines; flowers white; leaflets pubescent or glabrous.

3. *DALBERGIA COROMANDELIANA*, Prain Ann. Calc. x. 46, t. 21.
W. Gháts, Sivagiri Hills of Tinnevely (Wight).
An erect spinous shrub with very small leaves and sub-acute pod.
4. *DALBERGIA CANDENATENSIS*, Prain. *D. torta*, Grah.; Prain Ann. Calc. x. 54, t. 42. *D. monosperma*, Dalz.; F. B. I. ii. 237.
Coast of Travancore and Malabar, in Mangrove swamps.
A stout climbing shrub with the twigs often twisted into spiral hooks; flowers white.
5. *DALBERGIA ROSTRATA*, Grah.; Prain Ann. Calc. x. 60, t. 36. *D. Championii*, Thw.; F. B. I. ii. 231.
W. Gháts, Tambraparni river (Beddome).
A shrubby climber with cream-coloured flowers, the leaflets cuspidate with a retuse tip.
6. *DALBERGIA RUBIGINOSA*, Roxb.; Cor. Pl. t. 115; F. B. I. ii. 232; W. & A. 265; Prain Ann. Calc. x. 63, t. 40.
N. Circars, in the hills (*fide* Roxburgh); Mangalore in S. Canara (Wight); Coimbatore Hills, at 4,000 ft. (A. W. Lushington, Fischer).
A large climbing shrub.
7. *DALBERGIA CONGESTA*, Grah.; F. B. I. ii. 232, excl. syn. *D. Gardneriana*; W. & A. 265; Prain Ann. Calc. x. 66, t. 43.
W. Gháts, in the Nilgiri Hills, at 5,000 ft.
A large climbing shrub with white flowers and 1-seeded coriaceous pod.
8. *DALBERGIA GARDNERIANA*, Benth.; Prain Ann. Calc. x. 66, t. 44. *D. congesta*, Bak. in F. B. I. ii. 232 *in part*.
W. Gháts, in the Nilgiri Hills, at 5,000 to 7,000 ft.
A climbing shrub with white flowers, rusty-tomentose branchlets and 1-seeded thin pod.
9. *DALBERGIA MALABARICA*, Prain Ann. Calc. x. 67, t. 46. *D. tamarindifolia* var. *pubescens*, Bak. in F. B. I. ii. 235.
W. Coast, in dry forests of S. Canara, S. Travancore and Tinnevely.
A climbing shrub with white flowers and 1-seeded ovate-oblong thinly coriaceous pod.
10. *DALBERGIA ACACIAEFOLIA*, Dalz.; Prain Ann. Calc. x. 68, t. 47. *D. tamarindifolia* var. *acaciaefolia*, Bak. in F. B. I. ii. 235.

W. Coast, in dry forests in S. Canara and Tinnevely.

A woody climbing shrub or small tree with white flowers and very thin 1-2-seeded pod.

11. DALBERGIA LATIFOLIA, Roxb. Cor. Pl. t. 113; Fl. Br. Ind. ii. 231; W. & A. 264; Prain Ann. Calc. x. 80, t. 62.

N. Circars, scattered in hill forests, more common on the Godavari; Deccan, in forests in all Districts; W. Gháts, in dry forests as far South as the Anamalais. Blackwood or Rosewood.

A large deciduous tree in good soil, a small one in poor soil. Bark thick, grey; wood extremely hard, the heartwood dark purple with black streaks, used chiefly for furniture but also for agricultural purposes. Flowers white. Vern. Hind. Sitsal; Ur. Sissua; Tel. Jitegi; Tam. Eravadi.

12. DALBERGIA SISOIDES, Grah.; W. & A. 265; Prain Ann. Calc. x. 81, t. 63. *D. latifolia* var. *sissoides*, Bak. in F. B. I. ii. 231. *D. latifolia*, Wt. Ic. t. 1156; Bedd. Fl. t. 24.

W. Gháts, from the Mysore Hills southwards to the Pulneys and Hills of Travancore, at rather low levels but occasionally up to 5,000 ft. Malabar Blackwood.

A large deciduous tree, giving a fine dark-purple heartwood similar to the timber of *D. latifolia*, of which it seems to be the moist forest form. Flowers white. Vern. Tam. Thothagatti; Mal. Eetti, Vitti, Karitti.

13. DALBERGIA PANICULATA, Roxb. Cor. Pl. t. 114; F. B. I. ii. 236; W. & A. 265; Prain Ann. Calc. x. 87, t. 68.

All dry Districts, in deciduous forests, up to 1,500 ft.

A conspicuous tree from its smooth grey bark. The wood is rather soft, yellowish-white, in concentric bands of wood and bast tissue, and of no value, and so the tree is often left standing alone in forests which have been worked for timber and fuel. Flowers white or bluish-white. Vern. Hind. Passi; Ur. Dhupi; Tel. Patsaru; Tam. Panni vagei Mal. Vetta tholi.

14. DALBERGIA LANCEOLARIA, Linn. f.; F. B. I. ii. 235. *D. frondosa*, Roxb.; W. & A. 266 in part; Wt. Ic. t. 266; Prain Ann. Calc. x. 93, t. 76.

N. Circars and Deccan, scarce, in dry forests in hilly country; W. Gháts, from Canara to the Pulneys and Travancore, at low elevations, in grassy forests.

A large and pretty deciduous tree with grey smooth bark and white moderately hard wood of no great value. Flowers pinkish or bluish-white. Vern. *Tel.* Yerra patsaru; *Tam.* Erigei.

15. *DALBERGIA VOLUBILIS*, Roxb. Cor. Pl. t. 191; F. B. I. ii. 235; W. & A. 265; Prain Ann. Calc. x. 100, t. 85.

All dry Districts, in deciduous forests.

A large woody climber with light brown hard wood, the flowers pale blue.

Dalbergia Sissoo, Roxb., a tree of river beds in the Subhimalayan tract of N. India and valuable for its hard dark brown wood used for furniture and Ordnance purposes, is often planted in S. India and may sometimes be found run wild.

54. *Pterocarpus*, Linn.

Trees. *Leaves* alternate, imparipinnate; leaflets alternate, usually coriaceous; stipules small, deciduous; stipels 0. *Flowers* yellowish, in terminal or axillary racemes or panicles; bracts small, deciduous; bracteoles 2, caducous. *Calyx*-tube campanulate, somewhat curved; teeth short, the 2 upper often subconnate. *Corolla* exserted, the petals all long-clawed; standard orbicular, crisped at the margin; wings oblique, the margins also crisped; keel-petals oblique, smaller, slightly connate. *Stamens* 10, the filaments connate in a tube split above, sometimes split in 2 bundles of 5, sometimes the vexillary filament free; anthers uniform. *Ovary* sessile or stalked; ovules 2-6; style filiform, incurved, beardless; stigma capitate. *Pod* orbicular, compressed, with a broad wing, the style turned down towards the stipe. *Seeds* 1 rarely 2, oblong or subreniform; hilum small.

Flowers axillary, in simple or sparingly branched racemes; leaflets usually 3, rarely 4-5, broadly ovate or nearly orbicular, slightly emarginate; pod with .35 in. long stipe, concavely curved between the stipe and style.....1. *santalinus*.
Flowers in terminal panicles; leaflets 5-7 from elliptic-oblong, obtuse emarginate or even bilobed at apex to ovate acuminate; pod with .2 in. long stipe, convexly curved between the stipe and style

2. *Marsupium*.

1. *PTEROCARPUS SANTALINUS*, Linn. f.; F. B. I. ii. 239, W. & A. 266; Bedd. Fl. t. 22.

Deccan, in the Hills of Cuddapah, S. Kurnool, N. Arcot and Chingleput, up to 1,500 ft. Red Sanders.

A very pretty and valuable moderate-sized tree, found only on a limited area. Bark blackish-brown deeply cleft into rectangular plates; wood extremely hard, dark claret red to nearly black, used for house-posts, carvings and as a dye.

Vern. *Tel.* Yerra chandanum.

2. *PTEROCARPUS MARSUPIUM*, Roxb. Cor. Pl. t. 116; F. B. I. ii. 239; W. & A. 266; Bedd. Fl. t. 21.

All forest Districts, chiefly in deciduous forest, up to 4,500 ft.

A large deciduous tree, one of the most valuable in the Madras forests. Bark thick, grey, with vertical cracks. Wood very hard, yellowish-brown with darker streaks, used for building, furniture, agricultural and railway purposes. It gives a red gum-resin "Kino," used in medicine. Vern. *Hind.* Bijasal; *Ur.* Byása; *Tel.* Yegi; *Tam.* Vengai; *Kan.* Honné; *Mal.* Venga.

Var. *canus*, Gamble. Branchlets, leaves beneath, calyx and rhachis softly white-silky pubescent; leaves much smaller; flowers small, in shorter racemes.

Hills of the Kistna District (Beddome).

55. *Pongamia*, Vent.

A tree. *Leaves* alternate, imparipinnate; leaflets opposite; stipules small; stipels 0. *Flowers* in lax axillary racemes, the flowers in fascicles of 2-4 on the rhachis; bracts small, caducous; bracteoles minute. *Calyx* campanulate, truncate; teeth obsolete. *Corolla* much exserted; standard suborbicular with curved folds above the claw; wings obliquely oblong, slightly adnate above the claws to the obtuse keel petals which are joined near the tip. *Stamens* 10 monadelphous, the vexillary stamen free below and above; anthers uniform. *Ovary* subsessile; ovules 2; style incurved, beardless; stigma capitate. *Pod* obliquely oblong, attenuated at both ends, curved at apex, thick, more or less compressed, indehiscent. *Seed* 1, reniform, rather thick; hilum small.

PONGAMIA GLABRA, Vent.; F. B. I. ii. 240; W. & A. 262; Wt. Ic. t. 59; Bedd. Fl. t. 177.

Coast forests and on tidal river banks; inland chiefly along

streams and rivers in most Districts, in the hills up to 3,000 ft. Often planted in gardens and avenues.

A moderate-sized nearly evergreen tree with 5 or more rather large ovate acuminate leaflets and pinkish-white flowers. Bark thick, greyish-brown, tubercled; wood white, moderately hard, used for cart-wheels and other purposes. The seeds give an oil, used for burning and in medicine. Vern. *Hind.* Karanj; *Ur.* Koranjú; *Tel.* Kanuga; *Tam.* Ponga.

56. Derris, Lour.

Climbing shrubs, rarely erect trees. *Leaves* alternate, imparipinnate; leaflets opposite; stipules small; stipels usually 0. *Flowers* in fascicles, rarely solitary, on the rhachis of axillary or terminal racemes or panicles; bracts small, caducous; bracteoles ovate or orbicular, small, often caducous. *Calyx*-tube campanulate, nearly truncate; teeth very short. *Corolla* much exerted; standard obovate or orbicular, broad, not auricled and rarely callose; wings obliquely oblong, often spurred above the long claw, slightly adnate to the incurved obtuse keel. *Stamens* usually monadelphous, the vexillary filament free below, rarely quite free; anthers uniform, versatile. *Ovary* sessile or shortly stipitate, few-ovuled; style incurved; stigma capitate. *Pod* usually thin, sometimes thickened, indehiscent, oblong or obliquely orbicular, winged along the upper or both sutures. *Seeds* solitary or few, compressed, reniform or orbicular; hilum small.

Pod winged along the upper suture only:—

Pod narrow, ligulate, acute at both ends, up to 4 in. long and 5-seeded; leaflets many, elliptic-oblong, oblong-lanceolate or the end one obovate or oblanceolate, coriaceous, shining above, 1-2 in. long 1. *scandens*.

Pod broad, obliquely ovate or orbicular, obtuse at both ends, 1-1·5 in. long, 1 in. broad, 1-2-seeded; leaflets usually 5-7, ovate, acuminate, subcoriaceous, dull, 2·5-4 in. long 2. *uliginosa*

Pod winged on both sutures:—

Wings of pod narrow, the pods more or less flattened:—

Pods usually pointed at both ends:—

Pods glabrous, 1-3-seeded, up to 3·5 in. long, 1 in. broad, the tip hooked; leaflets oblong-lanceolate or -oblanceolate, up to 4 in. long, 1·5-1·5 in. broad 3. *canarensis*.

Pods ferruginous-tomentose, 1-2 in. long, 1·5-6 in. broad, the

lower wing very narrow, the apex sometimes obtuse, slightly hooked, the few veins prominent; leaflets 5-7, elliptic-ovate, coriaceous, greyish-green when dry, 1-1.5 in. or more long, .75-1 in. broad.....4. *Benthamii*.

Pods obtuse at both ends, especially at base, ferruginous-tomentose, about 2 in. long, 1 in. broad; leaflets 5-7, elliptic-obovate, abruptly obtusely acuminate, shining above, coriaceous, up to 4 in. long by 2 in. broad.....5. *brevipes*.

Wings of pod broad, the pod flat, glabrous, reticulately veined, the apex acute and hooked:—

Pod 2-4 in. long, 1-1.5 in. broad, ovate or oblong, seeds 1-3; flowers small, monadelphous, in lax panicles; leaflets 5-7, ovate or lanceolate, obtusely and often emarginately acuminate, coriaceous, 2-2.5 in. long 6. *Heyneana*.

Pod 4-5 in. long, 1-1.25 in. broad, oblong, 1-3-seeded; flowers large for the genus, diadelphous, in long panicles of racemes; leaflets 7-9, ovate- or lanceolate-oblong, rounded at base, obtusely acuminate at apex, reticulate, coriaceous, 3-4.5 long, 1.5-2 in. broad 7. *eulata*.

1. DERRIS SCANDENS, Benth.; F. B. I. ii. 240. *Dalbergia scandens*, Roxb. Cor. Pl. t. 192; W. & A. 264; Wt. Ic. t. 275.

Almost all forest Districts, from the N. Circars southwards, chiefly in open places.

A large climbing shrub with white or pink flowers on drooping branches, the pod sometimes up to 5-seeded.

Vern. *Tel.* Nalla tiga; *Tam.* Tekil.

2. DERRIS ULIGINOSA, Benth.; F. B. I. ii. 241. *Pongamia uliginosa*, DC.; W. & A. 262.

Sea-coast forests and tidal river banks on both sides of the Peninsula.

A large evergreen climbing shrub with rose-coloured flowers and rather large leaflets.

3. DERRIS CANARENSIS, Bak. in F. B. I. ii. 246. *D. oblonga*, Benth.; F. B. I. ii. 242; Trim. Fl. Ceyl. t. 29.

W. Coast, in evergreen forest and along backwaters.

A large climbing shrub with pink flowers.

4. DERRIS BENTHAMII, Thw. *D. paniculata*, Benth.; F. B. I. ii. 242. *D. Wightii*, Bak. in F. B. I. ii. 247.

W. Gháts, in the Sivagiri Hills, Tinnevely (Wight).

A slender glabrous climber.

5. DERRIS BREVIPES, Bak. in F. B. I. ii. 244.

W. Gháts, from the Nilgiris to the Hills of Travancore, up to 5,000 ft., common.

A large climbing shrub with red flowers, the pods very little known.

6. DERRIS HEYNEANA, Benth.; F. B. I. ii. 244.

W. Gháts, Hills of Travancore, up to 5,000 ft.

A large climber with small rose-red flowers in large panicles.

7. DERRIS EUALATA, Bedd. Ic. 42, t. 186, *doubtfully* of F. B. I. ii. 244. *D. platyptera*, Bak. in F. B. I. ii. 245.

W. Gháts and W. Coast, from S. Canara and Coorg to Travancore, at low levels.

A very large climbing shrub, with rather large white flowers and broadly-winged flat pods. The flowers solitary and not fascicled on the rhachis, the diadelphous stamens and reticulate leaves easily characterize this species.

57. *Sophora*, Linn.

Trees or shrubs. *Leaves* imparipinnate; leaflets opposite or subopposite; stipules lanceolate, deciduous; stipels setaceous or 0. *Flowers* showy, in terminal racemes or panicles; bracts linear, caducous; bracteoles 0. *Calyx*-tube widely campanulate, oblique at mouth; teeth short, deltoid. *Corolla* much exserted, the petals clawed; standard oblong obovate or orbicular; wings oblong, obtuse, sagittate or hastate above the claw; keel petals obtuse, cohering, sometimes with a mucro. *Stamens* 10, free; anthers versatile. *Ovary* stipitate, many-ovuled; style incurved; stigma terminal, minute. *Pod* moniliform, dehiscent or indehiscent, the joints turgid, sometimes with 4 wings. *Seeds* obovoid or globose; strophiole 0.

Pod not winged; standard narrow; attenuate into a broad claw:—

Pod velvety, 1-6-seeded, not much constricted between the seeds; standard obovate; leaflets more than 21, close, elliptic-oblong, subacute, mucronate, .75-1.25 in. long, densely golden-silky beneath; seeds white.....1. *glauca*.

Pod pubescent, 2-4-seeded, much constricted between the seeds; standard oblong; leaflets 11-15, distant, lanceolate, long-acuminate, 2-3 in. long, slightly brown silky beneath; seeds red.....2. *Wightii*.

Pod crisply 4-winged, especially opposite the seeds, much narrowed between them; standard orbicular with a slender claw; leaflets more than 19, elliptic, obtuse or emarginate, .75-1.25 in. long, prominently reticulate above, very slightly pubescent beneath.....3. *interrupta*.

1. *SOPHORA GLAUCA*, Lesch.; F. B. I. ii. 249; W. & A. 179; Wt. Ic. t. 979. *Edwardsia maderaspatana*, Wt. Ic. t. 1054, *except the pods*.

N. Circars, Mahendragiri Hill in Ganjam, at 3,000 ft. (Fischer and Gage); W. Gháts, common on open downs in the Nilgiri Hills, at 5,000 to 8,000 ft.; Hills of Travancore at Peermade, etc.; Shevaroy Hills of Salem.

A pretty shrub with white pink or purplish flowers.

2. *SOPHORA WIGHTII*, Bak. in F. B. I. ii. 250. *S. heptaphylla*, Wt. Ic. t. 1155, *not of Linn*.

W. Gháts, in the Nilgiri Hills, at about 4,000 ft.

A small tree with yellow flowers.

3. *SOPHORA INTERRUPTA*, Bedd. Ic. t. 165; F. B. I. ii. 251. *Edwardsia maderaspatana*, Wt. Ic. t. 1054, *Pods only*.

Deccan, Hills of Cuddapah and N. Arcot, at 2,500-3,000 ft. (Wight, Beddome).

A large shrub or small tree, with corky bark, yellow flowers and curiously winged and jointed pod.

58. *Calpurnia*, E. Mey.

Shrubs or trees. *Leaves* imparipinnate; leaflets many, opposite; stipules small; stipels 0. *Flowers* yellow, in racemes, axillary or paniced at the ends of the branchlets; bracts very small; bracteoles 0. *Calyx*-tube broadly campanulate, the teeth short and broad, the 2 upper subconnate. *Corolla* much exserted, the petals clawed; standard suborbicular, erect or recurved; wings falcate-oblong; keel petals incurved, obtuse, cohering at the back. *Stamens* 10, free; anthers versatile. *Ovary* stalked, linear, many-ovuled; style subulate, incurved; stigma capitate. *Pod* linear, flat, membranous, indehiscent, with a narrow wing on the dorsal suture, many-seeded. *Seeds* oblong, compressed, transverse; strophiole 0.

CALPURNIA AUREA, Bak. in F. B. I. ii. 251. *Virgilia aurea*, Lam.; W. & A. 179.

Deccan, in the Hills of Mysore and Coimbatore and the

Denkincottah Hills of Salem, up to 5,000 ft.; W. Gháts, in the Courtallum Hills of Tinnevely.

A large showy shrub with yellow flowers, leaves with many ovate oblong leaflets 1-1.5 in. long, and flat pods about 3 in. long and .5 in. broad with 3-6 seeds.

59. *Ormosia*, Jacks.

Erect trees. *Leaves* imparipinnate; leaflets opposite; stipules small; stipels usually 0. *Flowers* in terminal panicles or in racemes from upper leaf-axils; bracts small; bracteoles minute, linear. *Calyx*-tube shortly campanulate, deeply cleft, the upper teeth the shortest. *Corolla* little exerted, the petals with short claws; standard suborbicular; wings oblong, often more or less sagittate at base; keel petals free, somewhat incurved. *Stamens* 10, free, unequal; anthers versatile. *Ovary* sessile, 2-many-ovuled; style subulate, involute; stigma oblique. *Pod* thick, often woody, oblong or elongate, dehiscent, not winged. *Seeds* obovate or oblong, shining, the testa scarlet or brown-red, sometimes arillate.

ORMOSIA TRAVANCORICA, Bedd. Fl. t. 45; F. B. I. ii. 253.

W. Gháts, from S. Canara and Mysore to the Anamalais and the Hills of Travancore and Tinnevely, up to 3,000 ft., in evergreen forests, scattered and not common.

A lofty tree with stem unbranched for a considerable height, grey smooth bark and white moderately hard wood. The flowers are purple striped with green, the pod red with one red seed and the leaves have 7-9 ovate obtusely cuspidate coriaceous leaflets 2-3 in. long. Vern. *Tam.*, *Mal.* Malei manchádi.

Virgilia capensis, Lam., is a pretty Cape shrub with silvery leaves and pinkish flowers, cultivated in gardens on the Nilgiri Hills.

FLORA

OF THE

PRESIDENCY OF MADRAS

BY

J. S. GAMBLER

PART III

LEGUMINOSAE-CAESALPINIOIDEAE TO
CAPRIFOLIACEAE.

PUBLISHED UNDER THE AUTHORITY OF THE
SECRETARY OF STATE FOR INDIA IN COUNCIL

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LATE OF THE INDIAN FOREST DEPARTMENT

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1919

INTRODUCTION TO PART III.

As indicated in my Introduction to Part II, this one has had to be prepared with such material as was available in this country, chiefly the Herbaria at Kew and the British Museum and my own collections. But I have recently had, by the courtesy of the Regius Keeper, the use of the South Indian specimens in the Herbarium of the Royal Botanic Gardens, Edinburgh, among which are many of those collected by Roxburgh, Wight, Sir Walter Elliot, Dr. H. Cleghorn, Sir G. Watt and others. I have also been able to use, by the kindness of the Sherardian Professor of Botany at Oxford, the Dubois Collection made more than 200 years ago.

For the future, I am glad to say that the Madras and Calcutta and Travancore collections will again be available for the work.

I have thought it best to close this Part without breaking into the large Family of the Rubiaceae, but Parts I, II and III together will, by ending at p. 577, be still one page ahead of the proper number, 576.

J. S. GAMBLE.

Liss: September 25th, 1919.

FLORA OF MADRAS.

Subfamily II. CAESALPINIOIDEAE.

Trees or shrubs sometimes climbing, rarely herbs. *Leaves* pinnate or bipinnate, usually with many leaflets, sometimes reduced to 1 pair and these sometimes again more or less connate; stipels none or rarely minute. *Flowers* zygomorphic, rarely regular, hermaphrodite, various in size and colour, usually racemose, the racemes axillary, lateral or paniced at the ends of the branchlets. *Calyx* enclosing the disk; lobes usually 5 or 4 from union of the upper pair, separate to the margin of the short or elongated disk, or very rarely gamosepalous, imbricate, rarely valvate. *Petals* usually 5, rarely fewer or 0, the upper innermost in bud, the others imbricate. *Stamens* 10 or fewer by abortion, rarely numerous; filaments usually free. *Ovary* free or on a stalk which is more or less adnate to the disk. *Pod* dehiscent or indehiscent, often septate. *Seeds* various, albuminous or exalbuminous.

Tribe IX. EUCAESALPINIEAE.—Leaves all bipinnate or rarely simply pinnate; sepals free to the disk; anthers versatile:—

Flowers in racemes or panicles:—

Sepals imbricate:—

Pod not winged or rarely slightly winged; leaflets rather small 60. **Caesalpinia.**

Pod broadly winged along the upper suture; leaflets large

61. **Mezoneurum.**

Pod produced in a wing at the apex; leaflets small

62. **Pterolobium.**

Sepals valvate or subvalvate:—

Pod thin, flat; leaf rhachis long with many pinnae and leaflets; flowers large 63. **Delonix.**

Pod turgid, moniliform; leaf rhachis very short with 2–6 pinnae with many minute leaflets; flowers small 64. **Parkinsonia.**

Flowers in elongate racemes:—

Stamens 10; prickly climber with small leaflets and turgid subtorulose pod 65. **Wagatea.**

Stamens 5; unarmed lofty tree with large leaflets and flat-winged pod 66. **Acrocarpus.**

Tribe X. CASSIEAE.—Leaves simply pinnate; calyx-lobes usually free to the base:—

Petals 5; stamens 10, sometimes some reduced to staminodes; anthers usually dehiscent by a terminal pore; leaves abruptly pinnate 67. *Cassia*.

Petals 0; stamens 2, anthers dehiscent longitudinally; leaves imparipinnate 68. *Dialium*.

Tribe XI. BAUHINIEAE.—Leaves of 2 leaflets, usually joined together for a portion of their length, sometimes free; calyx gamosepalous:—

Petals unequal, erect or patent; stamens 10, sometimes reduced to 3 or even 1, the rest usually sterile 69. *Bauhinia*.

Tribe XII. AMHERSTIEAE.—Leaves usually abruptly pinnate; calyx-lobes free to the disk, usually imbricate; ovary 3-many-ovuled, the ovary stalk adnate to the disk:—

Petals wanting; stamens 3-9; calyx-lobes 4 70. *Saraca*.

Petals 3-5:—

Stamens monadelphous, only 3 developed; leaflets many

71. *Tamarindus*.

Stamens 5, free, equal, alternating with 5 staminodes

72. *Humboldtia*.

Tribe XIII. CYNOMETREAE.—Leaves abruptly pinnate, 2-many-foliate; calyx-lobes free to the disk, imbricate or valvate; ovary 1-2 ovuled; seed 1:—

Petals wanting:—

Leaflets 1 pair; stigma large, peltate; pod samaroid below

73. *Hardwickia*.

Leaflets 4-7; stigma minute; pod thickened below

74. *Kingiodendron*.

Petals 5; leaflets 1-3 pairs; stigma capitate 75. *Cynometra*

60. *Caesalpinia*, Linn.

Trees or shrubs or climbers, armed or unarmed. *Leaves* abruptly bipinnate; pinnae abruptly pinnate; leaflets many small or fewer and larger; stipules various; stipels 0 or converted into thorns. *Flowers* often showy, yellow or red, in axillary or terminal racemes or panicles; bracts caducous; bracteoles 0. *Calyx* of 5 sepals, connate at base in a disk-lined tube; the lowest sepal concave outermost. *Petals* 5, orbicular or oblong, clawed, the uppermost smallest. *Stamens* 10, free, declinate; anthers uniform. *Ovary* sessile, few-ovuled; style filiform; stigma ter-

minal. *Pod* oblong or ovoid, thin, flattened or turgid, sometimes spiny, sometimes torulose. *Seeds* transverse, ovate to orbicular.

Pod covered with wiry prickles, oblong, inflated; petals narrow; seeds 1-3, hard, globose, grey:—

Leaves with large foliaceous pinnate stipules; leaflets elliptic-oblong, obtuse, mucronate, 1-2 in. long; bracts lanceolate, acuminate, 5 in. long; pods 2-3.5 in. long, 1.5-2 in. broad.....1. *crista*.
Leaves without stipules; leaflets elliptic-oblong, acute, 2-3 in. long; bracts subulate, .25 in. long; pods 4-5 in. long, 2 in. broad

2. *Jayabo*.

Pod with minute bristles, obovoid-falcate, turgid, shortly beaked, 1.5-2 in. long, .7 in. broad, 2-seeded; stems leaf-rhachises and pedicels densely prickly; leaves with many short pinnae each with 10-20 pairs of small leaflets; racemes 1-2.5 ft. long.....3. *mimosoides*.

Pod without prickles or bristles, usually glabrous:—

Pod flattened, not twisted or torulose:—

Pod obliquely ovoid, beaked, 2-2.5 in. long, 1.25 in. broad, 1-seeded; stems recurved prickly; pinnae 3-4 pairs, leaflets 2-3 pairs, ovate, acute, up to 2 in. long, 1 in. broad; flowers in panicles of racemes.....4. *Nuga*.

Pod obliquely-oblong, truncate at apex and prominently beaked on the upper suture, 3-4 in. long, 1.5 in. broad, 3-4-seeded; stem with few prickles; pinnae 8-12 pairs, leaflets 10-18 pairs, oblong-falcate; 5 in. long; flowers in panicles of racemes.....*Sappan*.

Pod oblong, sometimes slightly winged on the upper suture, prominently beaked 3-4 in. long, 1 in. broad, 6-8-seeded; stems etc., with many recurved thorns; pinnae 5-10 pairs, leaflets 8-12 pairs, .5-.7 in. long; flowers in racemes with long pedicels

5. *sepiaria*.

Pod oblong, straight, thin, 2-3 in. long, .7 in. broad, shortly beaked; stems nearly unarmed, erect; pinnae 6-8 pairs, leaflets about 10, obovate, .5-.7 in. long; flowers in subcorymbose racemes

pulcherrima.

Pod torulose, thick, oblong, with a short recurved beak, 1.5-2 in. long, .7 in. broad, 2-4-seeded; prickles few; pinnae about 10 pairs, leaflets 8-10 pairs, .3-.4 in. long; flowers in racemes6. *digyna*.

Pod twisted, thin; stems unarmed; pinnae 7-8 pairs, leaflets 25-30, very narrow, .25 in. long; flowers small, in short dense panicles.....*Coriaria*.

1. CAESALPINIA CRISTA, Linn. *C. Bonducella*, Flem.; F. B. I. ii.

254. *Guilandina Bonduc*.; W. & A. 280 in part var. *minor*, DC.

In most Plains Districts, in hedges and on waste lands near villages, especially near the coast.

A large straggling very thorny shrub with yellow flowers. The hard grey seeds are used in medicine to give a bitter tonic. Vern. *Hind.* Kat karanj.; *Tel.* Getsakeia; *Tam.* Kalichikai.

2. CAESALPINIA JAYABO, Maza; Merr. in Interp. Herb. Amb. 261. *C. Bonduc*, Baker in F. B. I. ii. 255. *Guilandina Bonduc.*, W. & A. 280 in part var. *major*, DC.

Carnatic, near the coast (?) (G. Thomson).

A large straggling shrub with yellow flowers and larger leaflets than the last.

3. CAESALPINIA MIMOSOIDES, Lamk.; F. B. I. ii. 256; W. & A. 281; Wt. Ic. t. 392.

W. Coast and W. Gháts at low levels and up to 4,000 ft.

A very prickly climbing shrub with bright yellow flowers.

4. CAESALPINIA NUGA, Ait.; F. B. I. ii. 255. *C. paniculata*, Roxb.; W. & A. 281; Wt. Ic. t. 36.

W. Coast, on river banks.

A large climbing shrub with yellow fragrant flowers.

5. CAESALPINIA SEPIARIA, Roxb.; F. B. I. ii. 256; W. & A. 282; Wt. Ic. t. 37.

Circars, Deccan and Carnatic in hedges and open bushy places; W. Gháts, up to 6,000 ft. The Mysore Thorn.

A large straggling thorny shrub with bright yellow flowers, usually very pubescent, but sometimes in the Deccan nearly glabrous as in N. India. Vern. *Hind.* Aila; *Ur.* Gilo; *Mar.* Chillari.

6. CAESALPINIA DIGYNA, Rottl.; F. B. I. ii. 256; W. & A. 281. N. Circars, from Ganjam to Godavari, chiefly near villages.

A prickly climbing shrub, with yellow flowers, the upper petal streaked with red. The seeds give an oil and the pods are said to give a very valuable tanning material.

Caesalpinia Sappan, Linn., is the Sappan Wood, a tree with an orange-red hard heartwood, which besides being useful in turnery gives a red dye. It is only found in cultivation. *C. pulcherrima*, Swartz, is an erect shrub with yellow or scarlet flowers with long stamens, very common in gardens. *C. Coriaria*, Willd., the "Divi-divi," is a small branching South American tree, cultivated for its pods, which are a valuable tanning material.

61. *Mezoneurum*, Desf.

Prickly woody climbing shrubs. *Leaves* abruptly bipinnate; pinnae abruptly pinnate; leaflets small and numerous or large and few; stipules small or 0; stipels 0. *Flowers* in axillary or terminal panicles of racemes; bracts narrow, usually deciduous; bracteoles 0. *Calyx* very oblique, the tube short; lobes imbricate; the lowest longest and hood-like. *Petals* 5, 4 orbicular, spreading, subequal, the uppermost different. *Stamens* 10, free, exserted; anthers uniform. *Ovary* sessile or shortly stalked, 2-many-ovuled; style filiform; stigma small, capitate. *Pod* oblong, flat, thin, indehiscent, broadly winged along the upper suture. *Seeds* transverse, compressed, orbicular or reniform.

MEZONEURUM CUCULLATUM, W. & A. 283; F. B. I. ii. 258; var. *grandis*, Baker in F. B. I. ii. 258.

Malabar and Travancore, in forests up to 2,000 ft.

A large climbing shrub, the stems with conical corky protuberances bearing a pair of hooked thorns; the upper petal short and wide, 2-lobed; the leaflets 3-4 in. long.

62. *Pterolobium*, R. Br.

Trees or climbing shrubs, armed with recurved thorns. *Leaves* bipinnate, the leaflets small; stipules and stipels small, caducous. *Flowers* small, in axillary or terminal racemes, long-pedicellate; bracts subulate, caducous; bracteoles 0. *Calyx*-tube short, cup-shaped, persistent; lobes 5, imbricate, the lowest longest. *Petals* 5, unequal, clawed, as long as the calyx-lobes. *Stamens* 10, free, the filaments villous; anthers uniform. *Ovary* sessile, 1-ovuled; style subulate; stigma terminal, dilated. *Pod* indehiscent; samaroid, 1-seeded, ending in an oblong or falcate wing. *Seed* large, compressed.

PTEROLOBIUM INDICUM, A. Rich.; F. B. I. ii. 259. *P. lacerans*, Wall.; W. & A. 283; Wt. Ic. t. 196.

All dry forest Districts from the Godavari southwards to the lower Pulneys. Common in open places over bushes and small trees.

A very thorny straggling or climbing shrub with yellow flowers and reddish winged pod. Vern. Tel. Walekaduda.

63. *Delonix*, Raf.

Erect unarmed trees. *Leaves* abruptly bipinnate; leaflets many, small; stipules small; stipels 0. *Flowers* large, showy, in terminal corymbs; bracts small, caducous; bracteoles 0. *Calyx*-tube very short; lobes 5, valvate, subequal. *Petals* 5, orbicular, imbricate, clawed, subequal or the uppermost dissimilar; margins fimbriate. *Stamens* 10, free, declinate, long-exserted; filaments villous below; anthers uniform. *Ovary* subsessile, many-ovuled; style filiform; stigma truncate, ciliolate. *Pod* elongate, flat, woody, dehiscent. *Seeds* transverse, oblong.

Petals yellowish-white, turning orange; leaflets 5 in. long; pod 6-8 in. long, 1 in. broad.....1. *elata*.

Petals crimson, the claws yellow, the upper petal white streaked with red and yellow; leaflets 25 in. long; pod up to 2.5 ft. long, 2 in. broad.....*regia*.

DELONIX ELATA, Gamble n. comb. *Poinciana elata*, Linn.; F. B. I. ii. 260; W. & A. 282; Bedd. Fl. t. 178.

Planted as an avenue tree and run wild; rare, but found in forests on both sides of the Peninsula according to Roxburgh, Brandis and Beddome, but this is very doubtful.

A pretty medium-sized tree with a yellowish-white wood. The branches and leaves are cut for leaf-manure. Vern.

Tel. Sankesula; Tam. Padenarayan.

Delonix regia, Raf., the Gul Mohr or Flamboyant tree is an introduction, said to come from Madagascar, and is planted in gardens and avenues for ornament and for the shade given by its rounded head, bright green leaves and magnificent trusses of crimson flowers. The wood is soft and white, of no value.

64. *Parkinsonia*, Linn.

Small armed trees. *Leaves* bipinnate with a very short main rhachis; pinnae long, with flattened rhachis bearing many very small leaflets; stipules spinescent, straight; stipels 0. *Flowers* in short lax axillary racemes, pedicels long; bracts small, caducous; bracteoles 0. *Calyx*-tube short, disk-lined; lobes membranous, slightly unequal, subvalvate. *Petals* 5, spreading, with short broad claws, that of the uppermost longer. *Stamens* 10, free; filaments villous; anthers uniform. *Ovary* shortly stalked, many-ovuled; style filiform; stigma small, terminal.

Pod linear, torulose, turgid at the seeds, finally dehiscent. *Seeds* oblong, elongate.

PARKINSONIA ACULEATA, Linn.; F. B. I. ii. 260; W. & A. 284.

In all dry Districts, a native of Tropical America, run wild, often on black cotton soil.

A small tree or shrub with showy yellow flowers and narrow pods, the very small leaflets often early deciduous. Vern. *Teb. Sinia tumana*.

65. Wagatea, Dalz.

A climbing shrub with scattered prickles. *Leaves* abruptly bipinnate, pinnae 4-6 pair, leaflets 6-7 pair, oblong; stipules small. *Flowers* subsessile in long simple or paniced spicate racemes; bracts minute. *Calyx*-tube campanulate; lobes 5, subvalvate, the lowest rather the largest. *Petals* 5, subequal, erect, oblong, obtuse, imbricate. *Stamens* 10, free; filaments pilose at the base; anthers uniform, alternate ones shorter. *Ovary* subsessile, free, many-ovuled; style slightly clavate; stigma oblique. *Pod* oblong, indehiscent, subtorulose, turgid at the seeds. *Seeds* ovoid.

WAGATEA SPICATA, Dalz.; F. B. I. ii. 261; Wt. Ic. t. 1995.

W. Gháts, in S. Canara, Mysore and Malabar, up to 3,000 ft.

A prickly climber with scarlet calyx and orange petals.

66. Acrocarpus, Wt.

An erect unarmed tree. *Leaves* bipinnate, pinnae 3-5 pairs, each with 5-6 pairs of large leaflets, paripinnate; stipules deciduous; stipels 0. *Flowers* in dense axillary racemes, usually deflexed, pedicels short; bracts small, caducous, like the small lanceolate bracteoles. *Calyx*-tube campanulate, disk-lined; lobes 5, lanceolate, equal, as long as tube. *Petals* 5, narrow, subequal. *Stamens* 5, free, exserted, anthers versatile. *Ovary* stipitate, many-ovuled; style short, incurved; stigma minute. *Pod* flat, ligulate, dehiscent, the upper suture winged, 5-10-seeded. *Seeds* obovate, oblique, compressed.

ACROCARPUS FRAXINIFOLIUS, Wt. Ic. t. 254, *excl. leaf*; F. B. I. ii. 292; Bedd. Fl. t. 44.

W. Gháts, in the Nilgiri, Anamalai, Travancore and Tinnevely hills, in evergreen forest up to 4,000 ft.; often planted.

A very large and lofty deciduous tree with large buttresses,

the flowers green with crimson stamens, the leaflets elliptic-lanceolate, 3-4 in. long, bright red when young. Bark light grey; wood light red, useful for building and furniture. Vern. *Tam.* Malam konné; *Mal.* Kurangan.

67. *Cassia*, Linn.

Trees, shrubs or herbs. *Leaves* abruptly pinnate, the rhachis often furnished with glands between the leaflets or on the petiole below them; stipules various; stipels 0. *Flowers* usually yellow, often large and showy, in axillary racemes, terminal panicles or supra-axillary fascicles of 1 or more; bracts and bracteoles present, various. *Calyx*-tube very short; lobes 5, imbricate. *Petals* 5, imbricate, subequal or the lower the largest. *Stamens* normally 10 but rarely all perfect and equal, 2-5 usually the uppermost, being sometimes wanting or reduced to staminodes; anthers of the 3 lowest stamens often the longest, all dehiscing by terminal pores or by a short slit. *Ovary* sessile or stalked, many-ovuled; style incurved; stigma terminal, usually truncate, sometimes ciliolate. *Pod* variable, dehiscent or indehiscent, terete or flat, usually septate between the seeds. *Seeds* transverse, rarely longitudinal, usually compressed, albuminous.

Sepals broad, obtuse :—

Stamens all antheriferous, but the 2-3 lowest larger than the others and with longer filaments; pods long, terete, indehiscent, cylindrical, transversely septate :—

Leaflets 4-8 pairs, ovate, acute, 2-6 in. long; petals yellow; pod 1-2 ft. long1. *Fistula*.

Leaflets 10-20 pairs, oblong, obtuse, 1-2 in. long; petals rose-coloured; pod under 6 in. long2. *marginata*.

Stamens with 6-7 antheriferous, the rest reduced to staminodes pods usually dehiscent, transversely septate :—

Leaves with 1 gland just above the base of the petiole, none between the leaflets :—

Leaves almost glabrous; pods compressed, torulose, the margins thickened :—

Leaflets 3-5 pairs, ovate, acuminate, 1-3 in. long; pods flat3. *occidentalis*.

Leaflets 5-10 pairs, oblong-lanceolate, about 1 in. long; pods more or less turgid4. *Sophera*.

Leaves and pods hirsute; leaflets about 4 pairs, lanceolate, 2-4 in. long; pods slender, flattened5. *hirsuta*.

Leaves with subulate glands between the leaflets, none on the petiole base; stipules narrow, caducous:

Leaflets 3 pairs, obovate, obtuse; flowers small, in axillary pairs; pods slender, subtetragonous; annual herbs.....6. *Tora*.

Leaflets 3-5 pairs, lanceolate or oblong-lanceolate, acuminate, glabrous; flowers in subterminal corymbs, large; pods cylindric, turgid, up to 3 in. long7. *laevigata*.

Leaflets 6-8 pairs, oblong, obtuse, densely tomentose beneath; flowers in subterminal corymbose racemes, large; pods flattened, up to 5 in. long, pubescent8. *tomentosa*.

Leaves with subulate glands between all the 8-12 pairs of elliptic-obtuse leaflets, and a pair of large obliquely cordate stipules at their bases; flowers in subterminal but axillary corymbs, large; pods flat, papery, obtuse at each end, stalked, 4-5 in. long, 7 in. broad.....9. *auriculata*.

Leaves without glands on the petiole or between the leaflets:—

Pods more than 3 in. long:—

Stipules minute, caducous; racemes corymbose, forming a long terminal panicle:—

Pods 3-5 in. long, 5 in. broad, flat, long-apiculate, the sutures thin, with straight transverse ridges when dry; leaflets 10-16 pairs, oblong, 1-1.25 in. long, long-mucronate

10. *montana*.

Pods 6-9 in. long, 5 in. broad, the apicule deciduous, the sutures thickened, indented between the seeds; leaflets 8-14 pairs, oblong, emarginate, 1.5-3 in. long, shortly mucronate11. *siamea*.

Stipules broad, persistent:—

Flowers in axillary corymbose racemes forming a terminal panicle; leaflets 10-20 pairs, oblong, obtuse, mucronate, pubescent, 1-1.5 in. long; pods flat, thin, with their sutures 5-7 in. long, 5 in. broad, transversely ridged

12. *timoriensis*.

Flowers in long-peduncled racemes with broad bracts; leaflets 5-12 pairs, oblong, large, 2-6 in. long, up to 3 in. broad; pods membranous, dehiscent, winged at the middle of each valve *alata*.

Pods less than 3 in. long, oblong, thin, papery, rounded at both ends, curved:—

Pods 1-1.5 in. long, 5 in. broad, much curved, crested on the valves opposite the seeds; racemes short with small flowers; leaves with 4-6 pairs of obovate-oblong obtuse leaflets13. *obtusa*.

Pods 1·5-2 in. long, 6-7 in. broad, slightly curved, not crested; racemes long with large flowers; leaves with 5-8 pairs of lanceolate acute leaflets*angustifolia*.

Stamens 10, all equal, the two lowest with longer filaments; leaflets 4-6 pairs, ovate, acute or obtuse, glaucous; 1·5-4 in. long, 1-1·5 in. broad, usually with glands on the rhachis between the leaflets; pods straight, flat, thin, transversely barred, 6-8 in. long, 5-7 in. broad, stalked14. *glauc.*

Sepals narrow, usually acute, pod small, ligulate, dehiscent; fertile stamens 5 or 10:—

Leaflets 2 pairs, ovate, membranous, oblique, about 1 in. long; flowers axillary; fertile stamens 5, equal; pod 1-2 in. long by 25 in. broad, ligulate, viscous, glandular like the stems and branches15. *Absus*.

Leaflets very many, small, narrow, with a gland on the petiole below them; stipules conspicuous; flowers supra-axillary:—

Gland on the petiole stipitate, peltate; midrib close to the upper margin of the leaflet:—

Stamens 5, fertile, staminodes 0; leaflets 20-40 pairs, usually very crispate-villous; flowers very small, solitary...16. *pumila*.

Stamens 10, alternately long and short; leaflets 10-20 pairs, usually glabrous, the rhachis crispate-villous; flowers rather large, 1-3 together in a large bract17. *Kleinii*.

Gland on the petiole sessile:—

- Midrib nearer the upper than the lower margin of the sub-falcate leaflet:—

Leaves usually 3-4 in. long, less at base and in young plants; leaflets 40-60 pairs; stamens 10, alternately long and short, narrow; pod 1-2 in. long, 16-25-seeded.....18. *mimosoides*.

Leaves usually only 1-2 in. long, leaflets 16-24 pairs; stamens sometimes 10, usually 1-3 wanting or reduced to staminodes, broad at top; pod 1-2 in. long, 8-16-seeded

19. *Leschenaultiana*.

Midrib nearly central on the oblong leaflet; leaves 2-3 in. long with about 15 pairs of mucronate leaflets 6 in. long by 1-1·5 in. broad; stamens 10, all perfect or 1-3 reduced; pods 1-1·5 in. long, appressed-pubescent, about 10-seeded.....20. *nigricans*.

1. CASSIA FISTULA, Linn.; F. B. I. ii. 261; W. & A. 285. *C. rhombifolia* Roxb.; Wt. Ic. t. 269.

Deciduous forests in all Districts, frequently planted in gardens and avenues. The Indian Laburnum.

A moderate-sized tree with pale smooth bark when young, darker and rough when old, at once recognised by its long racemes of bright yellow flowers and long cylindrical pod. The wood is very hard, reddish-brown, strong and durable, especially useful for agricultural work. Vern. *Hind.* Amaltas; *Ur.* Sunari; *Tel.* Rela; *Tam.* Konnei; *Mal.* Konna; *Kan.* Kakke.

2. *CASSIA MARGINATA*, Roxb.; F. B. I. ii. 262. *C. Roxburghii*, DC.; W. & A. 286; Wt. Ill. t. 83; Bedd. Fl. t. 180.

Carnatic, in forests from S. Arcot to Travancore, elsewhere often planted for ornament.

A small deciduous tree with brown bark, short axillary racemes of rose-coloured flowers and a pod like that of the first, only shorter and more torulose. Vern. *Tam.* Vakai; *Mal.* Kada konna.

3. *CASSIA OCCIDENTALIS*, Linn.; F. B. I. ii. 262; W. & A. 290.

All plains Districts, by roadsides and on waste lands, perhaps introduced from W. Indies.

A diffuse undershrub with yellow flowers. Vern. *Hind.* Kasondi; *Tel.* Cashanda; *Tam.* Payaverai.

4. *CASSIA SOPHERA*, Linn.; F. B. I. ii. 262; W. & A. 287.

All plains Districts, by roadsides and on waste lands.

A diffuse undershrub with yellow flowers. Vern. *Hind.* Kasondi; *Tel.* Pydi-tangedu; *Tam.* Ponaveri.

5. *CASSIA HIRSUTA*, Linn.; Prain in Journ. As. Soc. Beng. lxi. 2. 474.

Deccan, in the Babubudan Hills of Mysore, 4,000 ft. (Talbot); Ramandrug, Bellary (Lushington), also in the Carnatic near Madras; an introduction from America now run wild.

A diffuse undershrub with flowers in pairs in the leaf-axils.

6. *CASSIA TORA*, Linn.; F. B. I. ii. 263 *in part*; W. & A. 290 *in part*.

All plains Districts, on waysides, waste places, fallow lands and in forest undergrowth, also in the hills at low elevations, up to 4,000 ft.

An annual weed, almost an undershrub, with small yellow flowers and very long curved pods with rhombohedral seeds which give a blue dye. Vern. *Hind.* Chakunda; *Tel.* Tantipu; *Tam.* Tagerai.

7. *CASSIA LAEVIGATA*, Willd.; Prain in Journ. As. Soc. Beng. lxvi. 2.476.

Nilgiri and Pulney Hills at 4,000–6,000 ft., introduced from tropical America and now run wild.

A conspicuous shrub with large yellow flowers.

8. *CASSIA TOMENTOSA*, Willd.; F. B. I. ii. 263; W. & A. 286.

Nilgiri and Pulney Hills, above 6,000 ft., introduced from tropical America and now run wild.

A conspicuous shrub with large yellow flowers.

9. *CASSIA AURICULATA*, Linn.; F. B. I. ii. 263; W. & A. 290; Trim. Fl. Ceyl. t. xxxiii.

Circars from Chicacole southwards, but not common; Deccan and Carnatic, in most Districts on dry stony hills and on black cotton soil, often gregarious.

A beautiful shrub with large bright yellow flowers. The bark gives a valuable tanning material, the collection of it forming an important forest industry. Vern. *Hind.* Tarwar; *Tel.* Tangedu; *Tam.* Avaram.

10. *CASSIA MONTANA*, Heyne; F. B. I. ii. 264; W. & A. 289.

Deccan and Carnatic, on dry stony hills and up to 3,000 ft.

A handsome shrub with yellow flowers. Vern. *Tel.* Pagadi tangedu, Konda tangedu.

11. *CASSIA SIAMEA*, Lamk.; F. B. I. ii. 264. *C. florida*, Vahl; W. & A. 288; Bedd. Fl. t. 179.

Carnatic, from the Shevaroy Hills southwards—common in forests (Beddome). Much planted in avenues, etc., and now naturalized.

A moderate-sized tree with yellow flowers in bracteate corymbs forming a large terminal panicle. Bark grey; wood dark brown to nearly black, hard and durable. Vern. *Tam.* Manja Konnei.

12. *CASSIA TIMORIENSIS*, DC.; F. B. I. ii. 265.

W. Gháts, on the Carcoor Ghát (Lawson) up to about 3,000 ft., low country of Travancore (Bourdillon).

A small tree or large shrub with pubescent leaflets and calyx, flowers yellow.

13. *CASSIA OBTUSA*, Roxb.; W. & A. 288; Wt. Ic. t. 757. *C. obovata*, Collad.; F. B. I. ii. 264.

Deccan and Carnatic, in dry places on open lands and pastures.

A diffuse perennial herb with pale yellow flowers. The leaves are sometimes used as a substitute for senna.

14. CASSIA GLAUCA, Lamk.; F. B. I. ii. 265; W. & A. 289.

W. Gháts, scarce as a wild plant, commonly planted in gardens.

A handsome shrub or small tree with pale yellow flowers and reflexed bracts.

- Var. *suffruticosa*, Prain. *C. suffruticosa*, W. & A. 289.

Circars, Deccan and Carnatic, chiefly on E. side.

A shrub with smaller leaflets, flowers and pod, the leaflets more numerous.

15. CASSIA ABSUS, Linn.; F. B. I. ii. 265; W. & A. 291.

All dry Districts, on waste lands and in open forest.

A viscous annual or biennial with very small reddish-yellow flowers.

16. CASSIA PUMILA, Lamk.; F. B. I. ii. 266; W. & A. 292.

Deccan and Carnatic, in pasture lands.

A small diffuse or procumbent undershrub with small yellow flowers on very short pedicels.

17. CASSIA KLEINII, W. & A. 293; F. B. I. ii. 266.

Deccan, in Cuddapah; W. Coast in S. Canara, Malabar and Travancore, scarce.

A diffuse undershrub with rather large yellow flowers, usually with long pedicels.

18. CASSIA MIMOSOIDES, Linn.; F. B. I. ii. 266. *C. angustissima*, Lamk.; W. & A. 292.

N. Circars, hills of Gumsúr; Deccan, in hills as Horsley Konda and Ramandrug, up to 4,000 ft.; W. Gháts, in Malabar, Nilgiris, Anamalais and Travancore Hills, up to 6,000 ft.

A diffuse undershrub with long slender branches and yellow flowers.

19. CASSIA LESCHENAULTIANA, DC.; Prain in Journ. As. Soc. Beng. lxvi. ii. 477. *C. Wallichiana*, DC.; W. & A. 292. *C. mimosoides* var. *Wallichiana*, Baker in F. B. I. ii. 266.

W. Gháts, in the Nilgiri, Anamalai and Pulney Hills up to 6,000 ft., in grass lands; Deccan, in the hills of Mysore.

A suberect undershrub with yellow flowers.

20. CASSIA NIGRICANS, Vahl; Prain in Journ. As. Soc. Beng. lxvi. ii. 477

W. Coast, in S. Canara (Hohenacker); Carnatic, near Tuticorin in Tinnevely (Wight), a coast species apparently. A shrub or undershrub with yellowish-red flowers, 2-5 together on rather stout pedicels some distance above the leaves.

Cassia alata, Linn., is a handsome shrub or small tree which has been introduced probably from the W. Indies, and is cultivated in gardens and possibly sometimes found run wild. *C. angustifolia*, Vahl; F. B. I. ii. 264 (*C. lanceolata*, W. & A. 288) is the Tinnevely senna cultivated in S. India for its leaves, which afford a purgative drug. *C. grandis*, Linn. f., is a large tree sometimes cultivated for ornament and in avenues.

68. *Dialium*, Linn.

Trees. *Leaves* imparipinnate, leaflets subopposite or alternate; stipules small; stipels 0, *Flowers* small, in axillary or terminal panicles of small cymules; bracts and bracteoles small, caducous. *Calyx*-tube very short; lobes 5, petaloid, imbricate. *Petals* small or 0. *Stamens* 2, rarely 3, free, with short filaments; anthers erect, oblong, longitudinally dehiscent. *Ovary* sessile, 2-ovuled; style subulate; stigma small, terminal. *Pod* ovoid-globose, indehiscent, 1-seeded; exocarp hard or fragile; endocarp usually pulpy. *Seed* 1, more or less compressed, albuminous; cotyledons flat.

DIALIUM TRAVANCORICUM, Bourd. in Ind. For. xxx. 243 with fig.

W. Gháts, in the forests of S. Travancore near Ponmudi at 1,000-2,000 ft.

A very large evergreen tree with globose pods and leaves with 7-11 caudate-acuminate leaflets 2-3 in. long by about 1 in. broad. The bark is pale brown and smooth and the wood brownish-grey with darker lines, likely to be useful. Vern. *Mal.* Malam puli.

69. *Bauhinia*, Linn.

Trees or shrubs, erect or climbing, the latter often with circinate tendrils. *Leaves* of 2 leaflets, free or more usually adnate into one entire leaf more or less deeply cleft at the apex and palmately ribbed; stipules usually small, caducous. *Flowers* more or less zygomorphic, in terminal or rarely axillary racemes

or in spreading or corymbose terminal panicles; bracts and bracteoles present, small, often caducous. *Calyx*-tube cylindric or turbinate, lined by the disk; limb entire and spathaceous with 5 teeth or cleft into lobes. *Petals* 5, slightly unequal, erect or spreading, imbricate, usually clawed, the upper petal innermost. *Stamens* 10 or reduced to 5 or 3 or even 1 fertile, the rest sterile or wanting; filaments free, filiform; anthers versatile, dehiscing longitudinally. *Ovary* stalked, many-ovuled; style short or filiform; stigma small or large and peltate, subterminal or oblique. *Pod* linear or oblong, flattened, continuous within or rarely septate, dehiscent or indehiscent. *Seeds* orbicular or ovate, compressed, albuminous.

Fertile stamens 10:—

Calyx spathaceous, 5-toothed at apex, the tube short; trees or shrubs:—

Pod dehiscent, thin, .5–.7 in. broad; flowers large:—

Flowers yellow, the standard with a red blotch; calyx-limb ovate, .5 in. long; leaflets 1–2 in. long, rounded at apex, connate for about half their length; pod 4–5 in. long, not ridged along the upper suture.....1. *tomentosa*.

Flowers white; calyx-limb long acuminate, 1–1.5 in. long; leaflets 3–6 in. long, acute at apex, connate for nearly two-thirds with a mucro; pod 4–5 in. long, ridged on each side along the upper suture.....*acuminata*.

Pod indehiscent, thick, falcate; flowers in lax racemes, small:—

Leaflets connate for two-thirds of their length, 1–2 in. long, rounded at apex; filaments .25 in. long, slender; pod 6–12 in. long, .7–1 in. broad2. *racemosa*.

Leaflets free or very shortly connate, under .75 in. long, rounded at apex; filaments .5 in. long, thick; pod 3–4 in. long, .4 in. broad, twisted*rufescens*.

Calyx-tube long, thin, pubescent, with 5 short lobes; tree with coriaceous, suborbicular, semicordate leaflets, glaucous beneath, connate for three-fourths of length or even more; flowers small in axillary corymbs; pod nearly straight, flattened, reticulate, beaked, 12–18 in. long, .75–1 in. broad3. *malabarica*.

Calyx-tube very long, leathery, as are the 5 narrow lobes, 1–1.5 in. long; climbing shrub with tendrils and free, rounded, ovate, semicordate leaflets 2–3 in. long; flowers large, in lax axillary racemes, the petals narrow, the anthers very long; pod very large, flat

diphylla.

Fertile stamens 3, sometimes 4 or 5:—

Trees:—

Flowers small, in large terminal panicles, the petals yellow with purple streaks; leaflets connate almost to the apex, coriaceous, 4–6 in. long; pods 5–6 in. long, 1·5 in. broad, flattened, gradually widening to an obtuse tip 4. *retusa*.

Flowers large, the petals purple-pink or white; pod 6 in.–1 ft. long, 75–1 in. broad, flat:—

Flowers white or pink, the uppermost petal darker and variegated, usually appearing before the leaves; leaflets ovate, rounded at apex, connate for about two-thirds up

5. *variegata*.

Flowers purple or rose, petals all similar, appearing with the leaves; leaflets oblong, obtuse or subacute at apex, connate about half way up and sometimes overlapping.....6. *purpurea*.

Climbers:—

Flowers rather large, in corymbose racemes:—

Fertile stamens 3; branchlets, leaves beneath, conspicuous tendrils and corymbs densely tawny villous; leaflets often very large, up to 18 in. long, connate for two-thirds up or higher; pod large, velvety, 9–18 in. long by 2–3 in. broad, the seeds flat. 7. *VahlII*.

Fertile stamens 4–5; no tendrils; branchlets, leaves beneath, and corymbs finely ferruginous pubescent; leaflets oblong, connate for about three-fourths up, about 5 in. long; pod flat, up to 6 in. long by 1 in. broad, slightly pubescent, ridged along the upper suture ... 8. *phoenicea*.

Flowers very small, in panicles of cylindric racemes; fertile stamens 3; glabrous, with many tendrils; leaflets small, when young long caudate-acuminate, when older joined in a nearly entire cordate leaf; pod thin, flat, oblong, 1·5–2 in. long 9. *anguina*.

Fertile stamen 1; calyx-limb spathaceous; leaflets ovate, semi-cordate, subacute at apex, up to 8 in. long, connate for nearly three-fourths up; pod flat, narrow, long-beaked.....*monandra*.

1. *BAUHINIA TOMENTOSA*, Linn.; F. B. I. ii. 275; W. & A. 295.

Circars and Carnatic, in dry forests from the Chilka Lake to Tinnevely, especially in Kistna and Guntúr Districts, often planted for ornament.

A shrub with pretty flowers and a tough, nearly black wood. Vern. *Hind*. Kachnar; *Tam.*, *Tel*. Kanchini.

2. *BAUHINIA RACEMOSA*, Lamk.; F. B. I. ii. 276; W. & A. 295; Bedd. Fl. t. 182.

Circars, Deccan and Carnatic in dry deciduous forests; W. Gháts, on dry slopes and up to 4,000 ft.

A small deciduous rather crooked tree with pale yellow flowers. Bark rough, nearly black; wood brown, hard, a good fuel. The inner bark gives a good fibre for rough ropes. Vern. *Hind.* Guriál; *Ur.* Ambhota; *Tel.* Are; *Tam.* Archi, Atti.

3. *BAUHINIA MALABARICA*, Roxb.; F. B. I. ii. 277; W. & A. 294.

N. Circars, in the Gumsur Sal forests and in the Godavari forests; W. Gháts, in deciduous forests, from S. Canara to Travancore, up to 2,000 ft.

A moderate-sized deciduous tree with cream-coloured flowers. Bark brown, rough; wood reddish-brown, with darker patches, moderately hard, but of little value. The leaves are acid. Vern. *Hind.* Amlosa; *Tel.* Puli shinta; *Kan.* Cheppura.

4. *BAUHINIA RETUSA*, Ham.; F. B. I. ii. 279.

N. Circars, on the slopes of the E. Gháts, in forest, scarce; Deccan, in Mysore, but rare.

A moderate-sized deciduous tree. Bark dark brown; wood red with darker patches and streaks, hard and of good quality. It gives a clear gum-like gum arabic, but less soluble in water. Vern. *Hind.* Semla; *Tel.* Nirpa.

5. *BAUHINIA VARIEGATA*, Linn.; F. B. I. ii. 284; W. & A. 296.

N. Circars, Deccan and Carnatic, in dry deciduous forest, especially on rocky hills; often cultivated for its beautiful appearance in flower.

A moderate-sized deciduous tree. Bark grey, with vertical cracks; wood greyish-brown with irregular darker patches, moderately hard. Vern. *Hind.* Kachnar; *Ur.* Borara; *Tam.* Segapu-manchori; *Tel.* Mandari.

6. *BAUHINIA PURPUREA*, Linn.; F. B. I. ii. 284; W. & A. 296.

N. Circars, Deccan and Carnatic, in deciduous forest, chiefly along water-courses; W. Coast, in dry forest lands; often cultivated in gardens.

A moderate-sized evergreen tree, often bushy, with rather large leaves. Bark grey to brown; wood dark brown, moderately hard, used for implements. Vern. *Hind.* Khairwal; *Tel.* Kanchanam; *Tam.* Mandari.

7. *BAUHINIA VAHLII*, W. & A. 297; F. B. I. ii. 279.

N. Circars, in forests down to the Godavari.

A gigantic climber with very thick stem and long branches bearing cream-coloured flowers with shortly-clawed petals. It is destructive to forest trees and has to be cut. The leaves are used as plates and for many other purposes; the seeds are roasted and eaten. Vern. *Hind.* Maljan; *Ur.* Shiali; *Tel.* Adda.

8. *BAUHINIA PHOENICEA*, Heyne; F. B. I. ii. 283; W. & A. 296. *B. Benthami*, Bedd. Ic. t. 107.

W. Gháts, from Coorg and Mysore to the Anamalais and Travancore, in evergreen forests.

A very large climber with brick-red flowers, the petals with long slender claws, the anthers long. It is very destructive to forest trees and has to be cut.

9. *BAUHINIA ANGUINA*, Roxb. Cor. Pl. t. 285; F. B. I. ii. 284 W. & A. 298.

Malabar and Travancore, near the coast, apparently scarce. Snake climber.

A large very long climber with curious stems alternately twisted one way and the other between the straight margins. Vern. Naga-mu-valli (Rheede).

Bauhinia acuminata, Linn., is a pretty shrub often found in gardens in the plains. I have seen no specimens from wild plants. *B. rufescens*, Lamk., is a tropical African species, cultivated and perhaps run wild on the coast near Madras. *B. diphylla*, Ham., is an extensively climbing Burmese species sometimes found in Madras Gardens, and at once recognised by its very small leaflets. *B. monandra*, Kurz, is a Madagascar shrub or small tree, grown in gardens in Madras.

70. *Saraca*, Linn.

Trees or large shrubs. *Leaves* abruptly pinnate; leaflets of few pairs, coriaceous; stipules connate, intrapetiolar; stipels 0. *Flowers* showy, yellow orange or red, in short dense often lateral corymbose panicles; bracts small, deciduous; bracteoles subpersistent, coloured. *Calyx* petaloid, tube elongate, cylindric, enclosing a lobed disk; lobes 4, ovate or oblong, imbricate. *Petals* 0. *Stamens* usually 7, rarely 3-4; filaments long, filiform;

anthers versatile, dehiscing longitudinally. *Ovary* stipitate, the stipe adnate below to one side of the disk, many-ovuled; style long, filiform; stigma small, capitate. *Pod* flat, oblong, coriaceous or almost woody, continuous within. *Seeds* obovate-orbicular, compressed, exalbuminous.

SARACA INDICA, Linn.; F. B. I. ii. 271; Bedd. Fl. t. 57. *Jonesia Asoca*, Roxb.; W. & A. 284; Wt. Ic. t. 206.

N. Circars, in Ganjam and Vizagapatam, in hill forests; S. Canara, Mysore and Travancore, scarce in a wild state, but frequently planted. The Asoka tree.

A small tree with brilliant orange-scarlet flowers and 2-3 pairs of oblong-lanceolate leaflets. Wood reddish-brown, soft. Vern. *Hind.* Asok; *Ur.* Oshoko; *Kan.* Ashunkar.

71. Tamarindus, Linn.

A tree. *Leaves* abruptly pinnate; leaflets many, small, opposite; stipules minute, caducous; stipels 0. *Flowers* in racemes at the ends of branches; bracts and bracteoles ovate-oblong, coloured, caducous. *Calyx*-tube turbinate, lined by the disk; lobes 4, lanceolate, membranous, imbricate. *Petals* 3, imbricate, the two lower reduced to scales. *Stamens* 3, perfect, the filaments connate about half-way up in a sheath split above, the rest reduced to bristle-like staminodes; anthers versatile, dehiscing longitudinally. *Ovary* stipitate, the stalk adnate to the disk, many-ovuled; style filiform; stigma capitate. *Pod* linear-oblong, incurved, thick, somewhat compressed, with brittle epicarp, pulpy mesocarp and leathery septate endocarp. *Seeds* obovate-orbicular, compressed, testa hard, albumen 0.

TAMARINDUS INDICA, Linn.; F. B. I. ii. 273; W. & A. 285; Bedd. Fl. t. 184.

All plains Districts, cultivated and self-sown, probably indigenous in Central Africa. The Tamarind.

A large evergreen tree of great importance, having rather small pink yellow-striped flowers, small acid leaflets and a pod whose pulp is made into preserves and also exported as a drug. The bark is dark grey and the wood, very hard and heavy, is of a dark purplish-brown colour and used for many household and agricultural purposes. Vern. *Hind.* Imli; *Ur.* Tentúli; *Tam.* Puli; *Tel.* Chinta.

72. *Humboldtia*, Vahl.

Trees. *Leaves* abruptly pinnate; leaflets 1 to 6 pairs, large, with prominent nerves connected by intramarginal loops; stipules persistent, usually leafy, of two parts—the erect stipules proper and a basal usually recurved appendage; stipels 0. *Flowers* in racemes, axillary to the upper leaves or on the branches or the stem; bracts ovate or oblong; bracteoles large, coloured, persistent. *Calyx*-tube turbinate or narrow, lined by the disk; lobes 4, subequal, coloured, imbricate. *Petals* 5 or 3, spathulate, clawed, exsert. *Stamens* 5 perfect alternating with 5 minute staminodes; filaments filiform; anthers oblong, versatile, dehiscing longitudinally. *Ovary* stipitate, the stalk adnate to the disk, few-ovuled; style long, filiform; stigma capitate. *Pod* oblong, oblique or falcate, compressed, dehiscent, coriaceous. *Seeds* transverse, compressed, albumen 0.

Leaflets 1 pair, subsessile, lanceolate, acuminate, with a broad gland at base, 5–6 in. long, 1–2 in. broad; stipules lanceolate, the appendages absent; racemes very short, on old wood 1. *unijuga*.
 Leaflets 2 pairs, subsessile, obovate-oblong, obtusely cuspidate, 4–7 in. long, 1.5–2 in. broad; stipules lanceolate, the appendages broadly reniform; racemes peduncled, about 6 in. long, axillary; branchlets sometimes swollen 2. *Brunonis*.
 Leaflets 3 or more pairs:—

Rhachis of leaves terete; leaflets reticulate:—

Internodes of the branchlets swollen and hollow; leaflets 3–5 pairs, elliptic-ovate, cuspidate, subcoriaceous, 3–4 in. long, 1–2 in. broad; stipules ovate, the appendages acuminate at ends; racemes about 3 in. long, axillary, erect 3. *laurifolia*.

Internodes not swollen; leaflets 3–4 pairs, oblong-lanceolate, acuminate, coriaceous, 5–10 in. long, 1.5–2.5 in. broad; stipules ovate, the appendages reniform; racemes peduncled, 5–6 in. long, tawny-velvety, axillary 4. *Vahliana*.

Rhachis of leaves flattened; leaflets 3–4 pairs, lanceolate, acuminate, chartaceous; 3–4 in. long, 1–1.5 in. broad; stipules ovate, the appendages small, falcate; racemes short, tawny-velvety, corymbose, in fascicles on the stems 5. *Bourdillonii*.

Rhachis of leaves winged, the wings obcordate; leaflets 4–6 pairs, oblong-lanceolate, long-acuminate, subcoriaceous, 6–15 in. long, 1.5–5 in. broad; stipules lanceolate falcate, the appendages ovate or reniform; racemes short, axillary or from old wood, corymbose, tawny-velvety 6. *decurrans*.

1. *HUMBOLDTIA UNIJUGA*, Bedd. Ic. t. 108; Fl. t. 183; F. B. I. ii. 274.
W. Gháts, in dense evergreen forests in S. Travancore and Tinnevely, at 3,000 to 4,000 ft.
A moderate-sized tree with crimson flowers, said to have a hard durable wood.
2. *HUMBOLDTIA BRUNONIS*, Wall. Pl. As. Rar. iii. t. 233; F. B. I. ii. 274; W. & A. 285; Wt. Ic. t. 1606.
W. Gháts, in evergreen forests of S. Canara, Coorg, Mysore, Malabar and W. Nilgiris.
A diffuse shrub or small tree with orange flowers, the bracteoles and calyx tawny-pubescent.
3. *HUMBOLDTIA LAURIFOLIA*, Vahl; F. B. I. ii. 273; W. & A. 285; Wt. Ic. t. 1605.
W. Gháts, in Malabar, apparently very scarce.
A small tree or shrub with numerous branches, the internodes of the branchlets curiously fistular, the cavities usually inhabited by small ants; flowers pink; pod acute; glabrous.
4. *HUMBOLDTIA VAHLIANA*, Wt. Ic. t. 1607-8; F. B. I. ii. 274.
W. Gháts, in Malabar, Travancore and Tinnevely, on low ground near rivers, Nilgiris (Wight).
A moderate-sized tree, the flowers white with a buff calyx, the pod acute at both ends, tawny-pubescent. Bark dark brown; wood light brown, moderately hard. Vern. *Mal. Koratthi*.
5. *HUMBOLDTIA BOURDILLONI*, Prain in Journ. As. Soc. Beng. lxxiii. 200.
W. Gháts, on the Peermerd Ghát, Travancore, at 3,000 ft.
A moderate-sized tree reaching 50 ft. in height, with petals white, veined with pink, the calyx crimson, the pod scarlet, dolabriform, 4 in. by 1 in., pubescent.
7. *HUMBOLDTIA DECURRENS*, Bedd. ex Oliver in Hook. Ic. Pl. t. 2368.
W. Gháts, in valleys about Ponmudi in C. Travancore, at 500-3,000 ft., in evergreen forest; Tinnevely (Beddome).
A moderate-sized tree with pink flowers and brown tomentose pod 3.5-5 in. long. Young leaves are white and pendulous. Bark bluish-green; wood greyish-brown. Vern. *Mal. Kuntháni*.

73. *Hardwickia*, Roxb.

Large tree. *Leaves* paripinnate, leaflets 1 pair with a minute bristle between; stipules small, caducous; stipels 0. *Flowers* small, numerous, in paniced racemes; bracts minute; bracteoles scale-like. *Calyx*-tube scarcely any; lobes usually 5, orbicular, petaloid, round the small basal disk, much imbricate. *Petals* 0. *Stamens* 10, alternately longer and shorter; filaments filiform; anthers versatile, dehiscing longitudinally. *Ovary* sessile, free, 2-ovuled; style filiform; stigma large, peltate. *Pod* a dry 1-seeded follicle, the seed at the apex where the pod dehisces, the base samaroid. *Seed* pendulous, obovate, compressed, 2-furrowed; testa crustaceous; albumen 0; cotyledons large, 2-grooved.

HARDWICKIA BINATA, Roxb. Cor. Pl. iii. 6, t. 209; F. B. I. ii. 270; W. & A. 284; Bedd. Fl. t. 26.

Deccan and Carnatic, in the Upper Godavari forests, Kistna and Guntúr, in the Ceded Districts, Mysore, Coimbatore and Salem, often forming gregarious forests.

A large deciduous tree with small yellowish flowers and *Bauhinia*-like leaflets. Bark dark grey, rough; wood extremely hard and heavy, dark red, streaked with black or purple, used for agricultural and many other purposes, but difficult to work. The leaves are cut for manure and the branchlets for the fibre of their bark. Vern. *Hind.* Anjan; *Tel.* Yepi; *Tam.* Acha; *Kan.* Kamra.

74. *Kingiodendron*, Harms.

Large tree. *Leaves* abruptly pinnate, the lower leaflets alternate, leaflets 4-7; stipules minute, caducous; stipels 0. *Flowers* very small, numerous, in panicles of racemes; bract ovate, very small, as are the 2 minute bracteoles. *Calyx*-tube almost wanting, disk very small; lobes 5, orbicular, gland-dotted, imbricate. *Petals* 0. *Stamens* 10 equal; filaments filiform, villous at base; anthers versatile, dehiscing longitudinally. *Ovary* sessile, villous at base, 2-ovuled; style subulate; stigma minute, oblique. *Pod* coriaceous or nearly woody, obovate, 1-seeded, the seed at the apex when the pod dehisces. *Seed* pendulous, compressed; testa membranous; cotyledons with balsam-bearing cells.

KINGIODENDRON PINNATUM, Harms in Engl. & Prantl Naturl. Pfl. Nacht. 194. *Hardwickia pinnata*, Roxb., F. B. I. ii. 270; W. & A. 284; Bedd. Fl. t. 255.

W. Gháts, in the evergreen forests of S. Canara (Beddome), Malabar, Travancore and Tinnevely up to 3,000 ft.

A very large handsome evergreen tree reaching 100 ft. in height, with very small white flowers. Bark dark brown and green, rough; wood dark red or reddish-brown with a sticky resin, used for planking and furniture. The resin, like copaiba balsam, is of value. Vern. *Tam.* Madayan sampráni; *Mal.* Shuráli.

75. *Cynometra*, Linn.

Trees. *Leaves* abruptly pinnate, the leaflets usually few; stipules caducous; stipels 0. *Flowers* small, in short corymbs or racemes fascicled in the axils of the leaves or on old wood; bracts ovate, dry, imbricate, at length deciduous, smaller upwards; bracteoles none or membranous, coloured. *Calyx*-tube very short, enclosing the disk; lobes 4 or 5, oblong, imbricate, at length reflexed. *Petals* 5, oblanceolate, almost included. *Stamens* 10, rarely many; filaments filiform; anthers small, versatile, dehiscing longitudinally. *Ovary* sessile or shortly stalked, 2-ovuled; style slender; stigma capitate. *Pod* variously shaped, turgid or flattened, indehiscent, the pericarp thick, 1-seeded. *Seed* thick or compressed; cotyledons fleshy; albumen 0.

Leaflets 1 pair, lanceolate, falcate, acuminate, 1·5–3 in. long, ·5–1·25 in. broad, very unequal sided; pod flat, semicircular, rugose, orange when dry, ·75 in. long on the inner or straight side.....1. *travancorica*.

Leaflets 2 pairs, oblanceolate, falcate, acute, the end ones the longest, 3–6 in. long, 1·5–2 in. broad, very unequal-sided; pod turgid, very rugose, ·5–1 in. long 2. *mimosoides*.

Leaflets 3 pairs:—

Leaflets obliquely obovate-oblong, obtusely acuminate and emarginate, 2·5–3·5 in. long, 1–1·25 in. broad, unequal-sided, the lowest pair the smallest, often only 1 in. long 3. *Beddomei*.

Leaflets obovate, emarginate at the blunt apex, cuneate at base, 1–1·5 in. long, ·5 in. broad, slightly unequal-sided, all pairs about equal; pod reniform globose, contracted in the middle, smooth, broader than long, ·6 in. in diam..... 4. *Bourdillonii*.

1. *CYNOMETRA TRAVANCORICA*, Bedd. Fl. t. 316; F. B. I. ii. 267.

W. Gháts, in S. Travancore and Tinnevely, at 2,000 to 3,000 ft. (Beddome); Tambracheri Ghát, Wynaad (Beddome, Barber).

A lofty tree with rosy-white flowers and only 1 pair leaflets, which when young are very thin and creamy-pink in colour.

2. *CYNOMETRA MIMOSOIDES*, Wall. *C. ramiflora*, Linn.; F. B. ii. 267 in part; W. & A. 293; Bedd. Fl. t. 315.

W. Gháts, in S. Travancore (Beddome), apparently very scarce.

A moderate-sized tree with large leaflets and curious wrinkled pods.

3. *CYNOMETRA BEDDOMEI*, Prain in Journ. As. Soc. Ben. lxi. ii. 478. *C. malabarica*, Bedd. MS. in Herb. Kew.

W. Gháts, Tambracheri Ghát, Wynaad (Beddome).

A large tree with crimson young leaves and flowers clusters from conspicuous imbricate bracts.

4. *CYNOMETRA BOURDILLONII*, Gamble in Kew Bull. 1908, 44.

W. Gháts, banks of the Parapár river, S. Travancore, 500 ft. (Bourdillon).

A handsome moderate-sized tree with large clusters flowers, small foliage and remarkable didymous small pods.

Wood hard, yellow; bark blackish-green.

C. cauliflora, Linn., with 2 leaflets and flower racemes from the branches is sometimes found in gardens.

Subfamily III. MIMOSOIDEAE.

Trees or shrubs, sometimes climbing, rarely herbs. *Leaves* bipinnate or less commonly simply pinnate. *Flowers* small, regular, usually 5-merous, usually hermaphrodite, sometimes polygamous, generally in heads or spikes; bracts small, at the base of or on the peduncle, usually deciduous; bracteoles 0 or very small and usually deciduous. *Calyx* more or less campanulate with usually 5, sometimes 3, 4 or 6 valvate lobes, sometimes free. *Petals* as many as the sepals, valvate, free or connate in lobed corolla. *Stamens* definite or indefinite; if definite as many as or twice as many as the sepals and petals, if indefinite usually very many, free or monadelphous. *Ovary* free, at the bottom of the calyx. *Pod* dehiscent or indehiscent, sometimes jointed. *Seeds* sometimes arillate, albuminous or exalbuminous; cotyledons flat.

Tribe XIV. ADENANTHEREAE.—Stamens definite, the anthers gland-crested at least in an early stage:—

Flowers in globose heads:—

Small herbs or undershrubs with small thin pods and small leaflets; lower flower neuter, the stamens reduced to elongate staminodes; seeds albuminous.....76. **Neptunia**.

Large trees with thick woody pods and large leaflets; all or nearly all the flowers perfect; seeds exalbuminous.....77. **Xylia**.

Flowers in elongate spikes:—

Large tendril-bearing climbers with very large broad pods and seeds; leaflets large and few; seeds exalbuminous...78. **Entada**.

Erect trees or shrubs with narrow pods and many leaflets; seeds albuminous:—

Unarmed trees with shortly stalked flowers and bright red seeds; leaflets fairly large.....79. **Adenanthera**.

Prickly trees or large shrubs with sessile flowers:—

Pods turgid, straight; leaflets distant.....80. **Prosopis**.

Pods thin, twisted; leaflets minute, contiguous

81. **Dichrostachys**.

Tribe XV. EUMIMOSEAE.—Stamens definite, the anthers not gland-crested; seeds albuminous:—

Pods straight, coriaceous, continuous, dehiscing at the sutures:—

Undershrubs with clavate stigmas.....**Desmanthus**.

Large shrubs or small trees with capitate stigmas.....**Leucaena**.

Pods curved, with segmented valves and indehiscent sutures

82. **Mimosa**.

Tribe XVI. ACACIEAE.—Stamens indefinite, seeds exalbuminous:—

Stamens free; flowers capitate or spicate.....83. **Acacia**.

Tribe XVII. INGEAE.—Stamens indefinite, monadelphous, rarely only 2-3 times as many as the petals; seeds exalbuminous:—

Leaves bipinnate:—

Pods not septate between the seeds:—

Pods straight, with thin valves.....84. **Albizzia**.

Pods curved or twisted with coriaceous valves

85. **Pithecolobium**.

Pods septate between the seeds.....**Enterolobium**.

Leaves simply pinnate.....86. **Inga**.

76. **Neptunia**, Lour.

Annual or perennial herbs or undershrubs, erect, prostrate or floating, the branches often compressed or angled. *Leaves bi-*

pinnate; leaflets many, small, sensitive; stipules persistent; stipels 0. *Flowers* small, sessile, in oblong or globose peduncled axillary heads; upper flowers ♂, lower ♂, lowest neuter with flattened staminodes; bracts minute. *Calyx* campanulate, small, 5-toothed. *Petals* 5, valvate, free or connate at the base. *Stamens* in ♂ and ♂ flowers 10, free, exserted; filaments slender; anthers gland-crested; staminodes in neuter flowers flattened. *Ovary* stalked, many-ovuled; style filiform; stigma minute, terminal, concave. *Pod* flat, membranous, oblong, 2-valved. *Seeds* transverse, compressed; with a filiform funicle.

A floating water-plant; leaves with 2-3 pairs of pinnae each with 8-15 pairs of leaflets, no gland on the rhachis; flower heads oblong, .5 in. long; pods .5-1 in. long, .3-.5 in. broad, obtuse, cuspidate

1. *oleracea*.

Land undershrubs; rhachis with a gland between the lowest pair of pinnae:—

Erect and moderately stout; leaves with 3-5 pairs of pinnae each with 10-30 pairs of leaflets; flower heads oblong, .5 in. long; pods 1-2 in. long, .3 in. broad, obtuse, apiculate *plena*.

Prostrate, diffuse and slender; leaves with 1-3 pairs of pinnae each with about 15 pairs of leaflets; flower heads globose, .2 in. in diam.; pods .5-1 in. long, .25 in. broad, subacute 2. *triquetra*.

1. NEPTUNIA OLERACEA, Lour.; F. B. I. ii. 285. *Mimosa natans*, Roxb. Cor. Pl. t. 119. *Desmanthus natans*, W. & A. 270.

Circars and Carnatic, in ponds and tanks of fresh water.

An annual water-plant, the branches zig-zag, bearing radical fibres at the nodes and spongy floats on the internodes.

Vern. Tel. Niru tavulupu, Nidra yung.

2. NEPTUNIA TRIQUETRA, Benth.; F. B. I. ii. 286. *Desmanthus triquetrus*, W. & A. 270; Wt. Ic. t. 756.

Circars, Deccan and Carnatic, in most Districts, in pasture lands.

Flowers yellow.

N. plena, Benth.; F. B. I. ii. 286 is a stouter plant, an introduction from America; Shevaroy Hills of Salem (Perrottet).

77. *Xylia*, Benth.

Trees. *Leaves* bipinnate, pinnae 1 pair; leaflets of few pairs, large; stipules small, deciduous; stipels 0. *Flowers* sessile in globose peduncled heads, the peduncles axillary, fascicled or

racemose; bracts 0; bracteole club-shaped. *Calyx* tubular-campanulate, 5-lobed. *Petals* 5, valvate, slightly connate at the base. *Stamens* 10, free, exserted; filaments slender; anthers tipped with a stalked gland which is early deciduous. *Ovary* sessile, many-ovuled; style filiform; stigma minute, terminal. *Pod* large, woody, flat, broadly falcate, septate between the seeds. *Seeds* oblong, compressed.

XYLIA XYLOCARPA, Taub. *X. dolabriformis*, Benth.; F. B. I. ii. 286; Bedd. Fl. t. 186. *Inga xylocarpa*, DC.; W. & A. 269.

Forests of the N. Circars, on the hills from Ganjam to Godavari, the chief tree of some forests; Deccan, in Hyderabad and Mysore, but scarce; W. Gháts, from S. Canara to N. Travancore.

A deciduous tree with 2 pairs of oblong lanceolate leaflets, the end pair up to 8 in. long, white flowers in globose heads and large woody dolabriform pods. Bark reddish-grey; wood hard, reddish-brown, durable and useful for sleepers and building purposes but difficult to work. Vern. *Hind.* Jambu; *Ur.* Boja, Kongora; *Tel.* Konda tangedu; *Tam.* Irúl; *Mal.* Irumalla.

78. *Entada*, Adans.

Large woody unarmed tendril-bearing climbers. *Leaves* bipinnate, the ultimate pinnae sometimes reduced to tendrils; stipules small, setaceous; stipels 0. *Flowers* very small, sessile, in long narrow spikes, polygamous. *Calyx* minute, campanulate, shortly 5-toothed. *Petals* free or slightly connate at the base, valvate. *Stamens* 10, free; filaments filiform or slightly expanded above; anthers shortly oblong, gland-crested. *Ovary* subsessile, many-ovuled; style filiform; stigma terminal, concave. *Pod* flat, woody, very large, of many discoid 1-seeded joints which with the persistent endocarp breakaway from each other and from the persistent thickened sutures. *Seeds* large, circular, compressed.

ENTADA SCANDENS, Benth.; F. B. I. ii. 286. *E. Pursaetha*, DC.; W. & A. 267.

Hill forests of the N. Circars; Deccan, in the Nallamalai Hills of Kurnool; W. Gháts, from S. Canara to Travancore, in evergreen forests.

A gigantic climber with very small yellowish flowers and huge

Pods; the leaflets 1-3 in. long, oblong, shining, obtuse or emarginate. The thick stems are spirally twisted, and the climber is bad for forest trees and has to be cut. The round flat shining seeds are eaten and may be hollowed out into small boxes and other articles. Vern. *Hind.* Gila; *Ur.* Geredi; *Mal.* Kaka valli.

79. *Adenanthera*, Linn.

Trees. *Leaves* bipinnate, the pinnae opposite; leaflets many, alternate; stipules minute, caducous; stipels 0. *Flowers* in slender spiciform racemes, either solitary and axillary or terminal and paniced; bracts minute, bracteoles 0. *Calyx* short, campanulate, 5-lobed. *Petals* 5, connate below, valvate. *Stamens* 10, free, scarcely exerted, alternately long and short; anthers oblong, ending in a stipitate gland. *Ovary* sessile, many-ovuled; style filiform; stigma small, terminal. *Pod* linear, torulose, curved, septate within, the valves much twisted after dehiscence. *Seeds* thick, with a hard shining scarlet or scarlet and black testa.

ADENANTHERA PAVONINA, Linn.; F.B. I. ii. 287; W. & A. 271; Wt. Ill. t. 84; Bedd. Fl. t. 46.

Commonly cultivated in gardens and avenues, doubtfully wild.

A handsome deciduous tree with many ovate-oblong leaflets about 1 in. long, pale yellow flowers and conspicuous pods with scarlet lenticular seeds. Bark grey; wood hard, close-grained, red, useful for building and furniture. The red seeds are used as ornaments and for jewellers' weights. Vern. *Tel.* Bandi gurivenda; *Tam.* Ani kundamani; *Mal.* Manchadi.

80. *Prosopis*, Linn.

Shrubs or trees with thorns. *Leaves* bipinnate, pinnae usually few-paired; leaflets many, small, narrow; stipules small or 0, sometimes spinescent; stipels 0. *Flowers* small, in narrow spikes or subspicate racemes; bracts and bracteoles 0. *Calyx*-tube campanulate, shortly toothed or subentire. *Petals* 5, valvate, connate at base, at length free. *Stamens* 10, free, slightly exerted; filaments filiform; anthers with a deciduous gland. *Ovary* sessile or stalked, many-ovuled; style filiform; stigma minute, terminal. *Pod* cylindric or linear, flat or turgid, often

torulose, straight or twisted, septate within, mesocarp thick, spongy. *Seeds* ovoid, compressed.

PROSOPIS SPICIGERA, Linn.; F. B. I. ii. 288; W. & A. 271; Roxb. Cor. Pl. t. 63; Bedd. Fl. t. 56; Brand. For. Fl. t. 25.

Deccan and Carnatic, from the Godavari southwards, on dry stony lands and on black cotton soil, in open forest, more rarely in thicker forest.

A small to moderate-sized deciduous tree with many thorns on broad bases, the leaflets distant, linear-oblong, about 5 in. long, the pods cylindric, torulose and pulpy. Bark thick, grey, rough; wood purplish-brown, hard, a good fuel. The pods are eaten by cattle. Vern. *Hind.* Jhand; *Tel.* Chani; *Tam.* Perumbe.

81. Dichrostachys, DC.

Shrubs, the branchlets often ending in spines. *Leaves* bipinnate; pinnae paripinnate; leaflets usually very small and numerous, opposite, contiguous; stipules lanceolate or subulate; stipels 0. *Flowers* in cylindric peduncled spikes on short axillary branchlets, the upper flowers ♂ yellow, the lower ones neuter, with pink filiform staminodes. *Calyx* campanulate, shortly toothed. *Petals* 5, valvate, connate below. *Stamens* 10, free, exserted; anthers ending in stalked glands. *Ovary* subsessile, many-ovuled; style filiform; stigma terminal, truncate. *Pod* linear, compressed, twisted up when ripe, continuous within, indehiscent or separating from the suture. *Seeds* obovate, compressed.

DICHROSTACHYS CINEREA, W. & A. 271; F. B. I. ii. 288; Roxb. Cor. Pl. t. 174; Bedd. Fl. t. 185.

N. Circars, Deccan and Carnatic, westwards to the dry slopes of the Ghâts, in dry scrub forests and on stony hills.

A thorny shrub or small tree with thorny branches, pretty tasselled flowers, twisted pods and very small pubescent leaflets. Bark grey or light brown; wood red streaked with black, very hard and tough and a good fuel. Vern. *Hind.*

Vurtuli; *Tel.* Velturu; *Tam.* Vadatalla; *Kan.* Wadu.

Desmanthus virgatus, Willd., is an introduced American under-shrub with flowers in small peduncled heads, small straight pods and small leaflets, occasionally found, especially near Madras.

Leucaena glauca, Benth., is a large shrub with rather large globose heads of white flowers, glaucous foliage with narrow

acute leaflets and flat strap-shaped pods. Probably North American in origin, it is frequently found in hedges and near villages in India.

82. *Mimosa*, Linn.

Herbs, shrubs or small trees, usually prickly. *Leaves* bipinnate; leaflets small, more or less sensitive, caducous, the rachis usually prickly; stipules small; stipels small, often 2 to each pinna. *Flowers* small, polygamous, in globose heads on axillary, solitary or fascicled peduncles, the upper peduncles often forming a terminal raceme; bracts small, deciduous; bracteole 1, minute. *Calyx* very small, campanulate, shortly 4-toothed. *Petals* 4, connate below, valvate. *Stamens* as many or twice as many as the petals, exserted; filaments filiform; anthers small. *Ovary* stipitate, many-ovuled; style filiform; stigma minute, terminal. *Pod* flat, membranous, of several 1-seeded joints that separate when ripe from each other and from the persistent sutures. *Seeds* ovoid or orbicular, flattened, albuminous.

Pinnae of the leaves 1-2 pairs digitately arranged; stamens as many as the petals; bracteoles stiff, bristly; pods under 1 in. long, .1-2 in. broad, the sutures with many spreading bristles..... 1. *pudica*.

Pinnae of the leaves more than 2 pairs, pinnate; stamens twice as many as the petals; bracteoles spatulate; pods more than 1 in. long, .3 in. broad:—

Leaves under 1 in. long with 3-5 pinnae; leaflets 7-8 pairs, shortly oblong, semicordate, .05-.15 in. long, under .1 in. broad, pubescent; peduncles usually longer than the leaves; pods grey-puberulous, the sutures spinose; seeds 5-6..... 2. *hamata*.

Leaves much over 1 in. long, longer than the peduncles; pods glabrous:—

Leaflets semicordate at base; sutures of pod with strong recurved prickles:—

Pods usually acutely pointed at tip, 3-6-seeded, .6 in. broad; leaves 3-4 in. long, pinnae 3-5 pairs about .75 in. apart; leaflets oblong to obovate, up to .25 in. long, the 4-5 pairs distant .2 or more in. apart; ovary glabrous 3. *polyancistra*.

Pods obtuse at tip, 6-8-seeded, .4-.5 in. broad, sometimes slightly pubescent; leaves 2-3 in. long, pinnae 5-7 pairs about .5 in. apart; leaflets oblong, the end ones subobovate, up to .3 in. long, the 7-8 pairs touching, .1-2 in. apart; ovary minutely pubescent 4. *Prainiana*.

Leaflets semirectangular at base; sutures of pod with few small or no prickles:—

Pods little curved, 2–3 in. long, .6–.7 in. broad, sessile or shortly stalked, rounded or rarely acute at apex, seeds 5–7; leaves with 5–6 pairs of pinnae 2–3 in. long, pinnules 10–15 pairs, .4–.7 in. long.....5. *rubicaulis*.

Pods much curved, 3–3.5 in. long, .3–.4 in. broad, long stalked, acute at apex and base; leaves with 6–8 pairs of pinnae, 1–1.5 in. long, pinnules 12–18 pairs, .2–.3 in. long.....6. *angustisilqua*.

1. *MIMOSA PUDICA*, Linn.; F. B. I. ii. 291.

All hot moist localities in the low country, probably introduced from tropical America. The Sensitive Plant. A diffuse undershrub with very sensitive leaves, pink flowers and bristly pods. It spreads very fast and is most troublesome and difficult to eradicate. Vern. *Hind*. Lajwati; *Tam*. Total vadi.

2. *MIMOSA HAMATA*, Willd.; F. B. I. ii. 291; W. & A. 268.

Deccan, from the Kistna southwards, often on black cotton soil.

A straggling prickly shrub with minute leaves and pink flowers.

3. *MIMOSA POLYANCISTRA*, Benth. in Trans. Linn. Soc. xxx. 422.

Deccan, in the Kurnool and Cuddapah Districts.

A straggling thorny shrub with pink flowers and distant rounded leaflets.

4. *MIMOSA PRAINIANA*, Gamble in Kew Bull. 1919, *ined*.

East Coast, in the Kistna District; Deccan, in Hyderabad to Anantapur.

A straggling thorny shrub with pink flowers and rounded leaflets, the pinnae in regular subequal pairs.

5. *MIMOSA RUBICAULIS*, Lamk.; F. B. I. ii. 291, *in part*; W. & A. 268; Hook. Ic. Pl. t. 156. *M. octandra*, Roxb. Cor. Pl. t. 200.

Deccan, forests of Cuddapah, Mysore, Coimbatore and Madura, usually in grassy savannahs and second-growth forests; W. Gháts, on eastern slopes.

A large, very prickly shrub, the flowers pink.

6. *MIMOSA ANGUSTISILQUA*, Gamble in Kew Bull. 1919, *ined*.

E. Gháts, at Tummularu, Godavari Agency (Barber).

A shrub with pink flowers, few prickles and very small hirsute leaflets.

83. *Acacia*, Willd.

Trees or erect or climbing shrubs, usually armed. *Leaves* bipinnate, the pinnae even-pinnate; leaflets usually small, opposite; leaves sometimes transformed into phyllodes; stipules various, often spinescent; stipels 0. *Flowers* small, hermaphrodite or polygamous, usually 5-merous, in globose heads or cylindric spikes; peduncles axillary, solitary or fascicled or in terminal panicles; bracts 1 or 2, on the peduncle; bracteoles 1 to each flower, spathulate or subpeltate. *Calyx* campanulate, shortly lobed. *Petals* exserted, more or less united, rarely free. *Stamens* indefinite, free or very shortly connate at base; anthers small. *Ovary* sessile or stalked, 2-many-ovuled; style filiform; stigma small, terminal. *Pod* variable, ligulate or oblong, flat and dry or rarely turgid or coriaceous, continuous or septate within but not disarticulating. *Seeds* transverse or longitudinal, usually ovate or compressed; funicle often long and conspicuous.

Erect trees or shrubs with stipular spines, and without prickles:—

Flowers in globose heads, the peduncles 2-bracteate:—

Flower-heads on axillary peduncles:—

Pod grey-downy, compressed, deeply indented on both sides between the seeds; flower-heads .5 in. in diam., peduncle bracteate above the middle; leaves 2–4 in. long with 4–9 pairs of pinnae; leaflets linear-oblong, obtuse, .2 in. long; spines straight, large ones slender, white, up to 2 in. long...1. *arabica*. Pod cylindric, turgid, usually curved:—

Peduncles bracteate at the apex:—

Pod 2–3 in. long, .5 in. in diam.; flower-heads .5 in. in diam.; leaves 1–2 in. long with 4–8 pairs of pinnae; leaflets linear-oblong, acute, .15–2 in. long, .1 in. broad; spines straight, short, rarely over .5 in. long..... 2. *Farnesiana*.

Pod 3–4 in. long, .3 in. in diam.; flower-heads .2 in. in diam.; leaves 1–1.5 in. long with about 8 pairs pinnae; leaflets linear-oblong, obtuse, .12 in. long, .03–.04 in. broad; spines short and slender or stout and strong, up to 1.5 in. long..... *tortuosa*.

Peduncles bracteate near the base; pod circinate, about 2 in. long, .25 in. in diam.; flower-heads .2 in. in diam.; leaves under 1 in. long with 3–4 pairs of pinnae; leaflets linear-oblong, minute, .06 in. by .01 in., obtuse, glabrous; spines both short and recurved and long, straight, slender, up to 2 in. long, white with brown spots..... 3. *planifrons*.

Pod flattened, straight or curved:—

Leaves glabrous, under 1 in. long; peduncles filiform, bracteate at or below the middle:—

Spines straight, some short thick, the rest white, often hollow, up to 2 in. long, .2 in. diam. at base; pinnae 3 pairs; leaflets elliptic or obovate, obtuse, about 5 pairs, .15 in. by .075 in.; flower-heads .2-.3 in. in diam.; pods very thin, flat, curved in a hook, .2 in. broad, 5-7-seeded

4. *eburnea*.

Spines of 2 kinds, short recurved and long slender, white, 1.5-2 in. long; pinnae 4-6 pairs; leaflets linear-oblong, obtuse, .1-.125 in. by .025 in.; flower-heads .3 in. in diam.;

“pods linear, variously bent (W. & A.)”...5. *Roxburghii*.

Leaves hairy; peduncles fairly stout, bracteate about the middle; spines all straight:—

Longer spines slender, white, up to 1.25 in. long; branchlets and leaves scurfy-villous; leaves under 1 in. long with 6-10 pairs of pinnae; leaflets minute, ovate-oblong, .075 in. by .025 in.; flower-heads .3 in. in diam.; pods 2-3 in. by .2 in. broad, papery, obtusely pointed, straight or curved 6. *Campbellii*.

Longer spines stout, up to 2.5 in. long, .2 in. broad at base; branchlets and leaves grey- or tawny-tomentose; leaves up to 3.5 in. long with 6-12 pairs of pinnae; leaflets oblong, .1-.15 in. by .05 in.; flower-heads .5 in. in diam.; pods 4-6 in. by .5 in., thick, curved, sharply pointed

7. *tomentosa*.

Pod not known; spines very stout, dark brown, up to 2.5 in. long, .3 in. in diam. at base; peduncles rather stout, the bracts below the middle; flower-heads .5 in. in diam.; leaves glabrous with 2-3 pairs of pinnae; leaflets oblong, obtuse, .25-.4 in. long by .1-.2 in. broad, prominently nerved 8. *Wightii*.

Flower-heads in panicles, .2-.3 in. in diam.; peduncles bracteate at the middle; spines usually short, straight, up to 1 in. long; leaves 1-2 in. long, with 5-15 pairs of pinnae; leaflets linear, subacute, about .2 in. long; pods flat, strap-shaped, 4-8 in. long, .3 in. broad 9. *leucophloea*.

Flowers in elongate spikes; peduncles usually 1-bracteate, bracts and bracteoles early caducous:—

Spines straight, short or long, longest up to 2 in. and .35 in. in diam. at base, often hollow; flower-spikes 1-1.5 in. long, bracteate a little above the base; leaves glabrous, 1-1.5 in. long with 2-5

pairs of pinnae; leaflets oblong, .2 by .04 in.; pods flat, up to 3 in. long by .8 in. broad, curved, obtuse, reticulate 10. *Latronum*.
 Spines short, hooked; flower-spikes 2-4 in. long:—

Leaflets 30-50 pairs, linear-oblong, pubescent, nerves obscure; calyx and petals white-villous, petals twice as long as calyx:—

Bark white; branchlets white-pubescent; leaflets .25-.35 in. long; petals narrow; pod 3-5 in. long, .5 in. broad, acute at both ends, grey, many-seeded 11. *Suma*.

Bark brown; branchlets brown, glabrous; leaflets .1 in. long; petals broad; pod 2-3 in. long, .4 in. broad, acute at both ends, brown, few-seeded 12. *Catechu*.

Leaflets 20-40 pairs, linear-oblong, glabrous, .125 in. long, nerves prominent; branchlets red; petals 3 times as long as calyx, both glabrous; pod 2-2.5 in. long, brown, obtuse at apex with a point, few-seeded 13. *Sundra*.

Leaflets 10-20 pairs, .25-.3 in. long, .1 in. broad, oblong, glaucous; petals rather more than twice the .05 in. calyx, both glabrous or the calyx minutely white pubescent; pods 3-5 in. long, .75-1 in. broad, apiculate, 4-7-seeded 14. *ferruginea*.

Leaflets 6-8 pairs, .75-1.25 in. long, .4-.5 in. broad, obovate-oblong, glaucous; petals about twice the .1 in. calyx, both glabrous; pods 6-8 in. long, 1 in. broad, thick, 6-9-seeded

15. *lenticularis*.

Climbing shrubs, with prickles on stems and leaf rachises, no stipular spines; peduncles bracteate:—

Pods thin, flat, coriaceous, the sutures straight, often thickened; stipules and bracts lanceolate:—

Leaflets more or less distant, not overlapping; flowers sessile:—

Glands near the base of the petiole flat; leaflets glabrous:—

Petiole gland oblong, up to .3 in. long; pinnae 5-6 pairs, leaflets 20-30 pairs, .15 in. apart, oblong, obtuse, truncate at base, .5-.6 in. long, .125 in. broad; pod 7 in. long, 1.25 in. broad, the sutures thick 16. *Hohenackeri*.

Petiole gland elliptic, .1-.2 in. long, somewhat convex; pinnae 6 pairs, leaflets 10-12 pairs, .2 in. apart, oblong-falcate, acute, subcordate at base, .4-.75 in. long, .1-.3 in. broad; pod 4-5 in. long, 1 in. broad, obtuse, the sutures slender 17. *caesia*.

Glands near the base of the petiole conical; pinnae 10-14 pairs, leaflets 25-40 pairs, touching but not overlapping, oblong-falcate, apiculate, truncate at base, pubescent beneath, .2-.3 in. long, .1-.2 in. broad; pod 5-6 in. long, .5-.75 in. broad, brown-velvety when young 18. *torta*.

Glands near the base of the petiole columnar; pinnae 8 pairs, leaflets 10-17 pairs, oblong, apiculate upwards, obliquely and subequally truncate at base, .4 in. long, .1-15 in. broad; pod 4-5 in. long, .75-1 in. broad, thin, glabrous

19. *columnaris*.

Leaflets closely set and overlapping, semi-truncate at base; flowers pedicellate:—

Leaflets .3-.4 in. long, .04-.07 in. broad, linear-oblong, obtuse or acute, ciliate on the margins, otherwise glabrous; pedicels very short; pod 6-8 in. long, .75-1.25 in. broad, the sutures thick 20. *pennata*.

Leaflets .2-.3 in. long, .03-.04 in. broad, linear, acute, slightly pubescent beneath; pedicels longer; pod about 4 in. long, .5 in. broad, the sutures only slightly raised 21. *canescens*.

Pods thick, fleshy, much wrinkled when dry, depressed between the seeds and often indented on the sutures; stipules and bracts ovate-cordate:—

Pinnae 4-6 pairs, leaflets about 18 pairs, .5-.75 in. long, .15-.2 in. broad; ovary pubescent; pod 1-1.25 in. broad 22. *rugata*.

Pinnae 8 pairs or more, leaflets more than 20 pairs, .25-.5 in. long, .04-.1 in. broad; ovary glabrous; pod .75 in. broad

23. *concinna*.

1. ACACIA ARABICA, Willd.; F. B. I. ii. 293; W. & A. 277; Roxb. Cor. Pl. t. 149; Bedd. Fl. t. 47.

Circars, Deccan and Carnatic, in dry localities. Either gregarious in patches of forest, especially on old tank beds and black cotton soil, or in groups or single trees among fields. Often cultivated and perhaps, although so common, not truly indigenous. The Babúl tree.

A moderate-sized tree with golden-yellow flowers, long white thorns and characteristic whitish-tomentose torulose pods which are eaten by cattle. Bark dark brown, rough; wood reddish-brown, hard and strong, useful for agricultural and many other purposes. Vern. *Hind.* Babúl, Kikar; *Tel.* Nalla túma; *Tam.* Karuvelam.

2. ACACIA FARNESIANA, Willd.; F. B. I. ii. 292; Bedd. Fl. t. 52. *Vachellia Farnesiana*, W. & A. 272; Wt. Ic. t. 300.

Circars, Deccan and Carnatic, cultivated and run wild, quite naturalized even up to 5,000 feet.

A thorny shrub with bright yellow very fragrant flowers

giving the perfume "Cassie." Vern. *Hind.* Wilayati kihar; *Tel.* Kusturi; *Tam.* Vedda vala; *Kan.* Jali.

Acacia tortuosa, Willd., is a large thorny shrub or small tree, native of S. America, occasionally found in cultivation in gardens in the low country.

3. *ACACIA PLANIFRONS*, W. & A. 276; F. B. I. ii. 293 *in part*; Trim. Fl. Ceyl. t. 35.

South Carnatic, in Madura, Tinnevely and S. Travancore, gregarious; cultivated in Bellary and elsewhere. The Umbrella thorn.

A small tree with white flowers and very minute leaflets, having spreading branches which form an umbrella-shaped top. Bark greyish-brown; wood pale yellow, hard and heavy, used for implements and as fuel. Vern. *Tam.* Odai.

4. *ACACIA EBURNEA*, Willd.; W. & A. 276; F. B. I. ii. 273 *in part*.

Deccan and Carnatic, from Mysore to Coimbatore and Tinnevely.

A small tree with red-purple corolla and yellow stamens and large ivory-white thorns, the pods papery, the leaflets few and comparatively large. Vern. *Tam.* Chilodai.

5. *ACACIA ROXBURGHII*, W. & A. 276. *A. planifrons*, W. & A.; F. B. I. ii. 293 *in part*. *Mimosa eburnea*, Roxb. Cor. Pl. t. 199.

Deccan, from Mysore and Bellary southwards.

A small thorny tree, with apparently yellow flowers on very slender peduncles.

6. *ACACIA CAMPBELLII*, Arn. in Nov. Act. Nat. Cur. xviii. 333. Circars, in forests near the coast from Godavari to Nellore; Deccan and Carnatic, especially in Cuddapah; often on black cotton soil.

A small branchy tree with apparently pink flowers and a yellowish-white hard wood. Vern. *Tel.* Marmati; *Tam.* Udai vél.

7. *ACACIA TOMENTOSA*, Willd.; F. B. I. ii. 294; W. & A. 276. N. Circars, from Ganjam to Godavari; Deccan, in Coimbatore, scarce.

A small tree with greenish-white flowers and large broad-based spines. Vern. *Tam.* Anaimalli.

8. ACACIA WIGHTII, Bak. in F. B. I. ii, 298.

S. Carnatic, in Travancore and Tinnevely (Wight), on the sea coast.

A small tree with very large spines and rather large leaflets.

9. ACACIA LEUCOPHLOEA, Willd.; F. B. I. ii. 294; W. & A. 277; Bedd. Fl. t. 48; Brand. For. Fl. t. 27. *Mimosa leucophloea*, Roxb. Cor. Pl. t. 150.

Circars, Deccan and Carnatic, in dry deciduous forests.

A moderate-sized or large tree with pale yellowish-white flower heads in large terminal panicles. Bark grey and smooth when young, dark brown and rough when old; wood reddish-brown, hard and tough, a good fuel. The bark is used in distilling and gives a good rough fibre. Vern. *Hind.* Nimbar, Safed babúl; *Tel.* Tella túma; *Tam.* Velvelam.

10. ACACIA LATRONUM, Willd.; F. B. I. ii. 296; W. & A. 273; Wt. Ic. t. 1157.

Deccan and Carnatic from the Kistna river southwards, gregarious on poor soils and forming extensive forests in places as in Guntur, Madura and S. Travancore.

A remarkable little tree with the habit of *A. planifrons* in its umbrella shape, but smaller. It has white flowers and very large white spines in pairs, often hollow and tenanted by ants. Bark dark reddish-brown; wood reddish, very hard, a good fuel. Vern. *Tel.* Paki tumma; *Tam.* Károdei.

11. ACACIA SUMA, Buch.-Ham.; F. B. I. ii. 294. *A. Catechu*, W. & A. 272 *excl. syn.*; Bedd. Fl. t. 49.

N. Circars, common; Deccan and Carnatic, in dry forests, to Coimbatore and the Shevaroy Hills.

A medium-sized pretty tree with white bark, white flowers and pubescent leaves with very many leaflets. Wood dark brown, hard and heavy. Vern. *Ur.* Gonhareea.

12. ACACIA CATECHU, Willd., F. B. I. ii. 295. *Mimosa Catechu*, Roxb. Cor. Pl. t. 175.

N. Circars, in Ganjam (Gamble).

A moderate-sized deciduous tree with pale yellow flowers. Bark dark greyish-brown, rough; wood red, hard and close-grained. From it the tan "Cutch" is extracted. Vern. *Hind.* Khair; *Ur.* Khoiru.

13. ACACIA SUNDRA, DC.; F. B. I. ii. 295; W. & A. 273; Bedd. Fl. t. 50. *Mimosa Sundra*, Roxb. Cor. Pl. t. 225.

Deccan and Carnatic, from the Kistna southwards to Cape Comorin, but most common in the Ceded Districts.

A moderate-sized tree with yellowish-white flowers, red branchlets and leaves with fewer leaflets than Nos. 11 and 12. Bark rusty brown; wood reddish-brown, hard and tough and useful for agricultural purposes, rice-pounders, fuel and "cutch." Vern. *Tel.* Sandra; *Tam.* Karangali.

14. ACACIA FERRUGINEA, DC.; F. B. I. ii. 295; W. & A. 273; Bedd. Fl. t. 51.

N. Circars, Deccan and Carnatic, in dry forests, to the E. slopes of the W. Gháts.

A large, deciduous, pretty tree with pale yellow flowers, glaucous leaves, *Albizzia*-like pods and few spines. Wood olive-brown, very hard, used for building and agricultural purposes. Vern. *Tel.* Ansandra; *Tam.* Velvelam.

15. ACACIA LENTICULARIS, Buch.-Ham.; F. B. I. ii. 296.

N. Circars, forests of Ganjam (Fischer).

A deciduous tree with greyish-white flowers, glaucous leaves, large pods with thickened sutures and few spines. Wood very hard, olive-brown.

16. ACACIA HOHENACKERI, Craib in Kew Bull. 1915, 408.

W. Gháts, Kundahs range of Nilgiris (Hohenacker), Coonoor (Bourne).

A climbing shrub with small recurved prickles and large thick pod.

17. ACACIA CAESIA, Willd. *A. Intsia*, W. & A. 278 *excl. most synonyms.*

Deccan, Hills of Cuddapah; W. Gháts, in the Anamalais.

A climbing shrub with rather large prickles and few rather large leaflets.

18. ACACIA TORTA, Craib. *A. caesia*, W. & A. 278 *not of Willd.* *Mimosa torta*, Roxb.

N. Circars, hills of Ganjam and Godavari; Deccan, in Hyderabad, Bellary, Mysore and Coimbatore; W. Gháts, in dry forest southwards to S. Travancore.

A large prickly climbing shrub, sometimes very pubescent, occasionally nearly glabrous.

19. *ACACIA COLUMNARIS*, Craib in Kew Bull. 1915, 410.
W. Coast and W. Gháts in S. Canara and Mysore (Hohenacker, etc.).
A prickly climbing shrub.
20. *ACACIA PENNATA*, Willd.; F. B. I. ii. 297 *in part*; W. & A. 277 *in part*.
N. Circars, Deccan and E. slopes of W. Gháts, up to 5,000 ft., in moderately dry forest, in ravines and along streams.
A large very prickly climbing shrub, nearly glabrous.
21. *ACACIA CANESCENS*, Grah. *A. pennata* var. *canescens*, F. B. I. ii. 298.
Deccan and Carnatic, in dry forests and scrub lands up to 5,000 ft., southwards to S. Travancore.
A large prickly climbing shrub, recognised by its minute, very narrow leaflets and pubescent branchlets and inflorescence.
22. *ACACIA RUGATA*, Ham. *A. concinna*, DC. var. *rugata*, Baker in F. B. I. ii. 297.
N. Circars, in Ganjam (Barber).
A stout, prickly, straggling or climbing shrub, chiefly of waste lands, the pods large and fleshy, used like those of *A. concinna*.
23. *ACACIA CONCINNA*, DC.; F. B. I. ii. 296; W. & A. 277.
Deccan and Carnatic and W. Coast.
A stout very prickly climbing shrub, chiefly of open waste lands, the calyx red and corolla white, the pods fleshy and rugose, used as a substitute for soap. Vern. *Hind.* Ban ritha; *Tel.* Sigekai.

Several species of *Acacia* have been introduced from Australia and planted about the hill stations of the W. Gháts. Most of them are, however, only garden plants, but two have been so largely grown to supply timber and fuel that they deserve special notice. They are:

1. *ACACIA MELANOXYLON*, R. Br. The Black Wattle. A large tree, easily recognised by its leaves, bipinnate when young, very soon being transformed into oblong-falcate or lanceolate phyllodes. The flowers are white and the pods narrow and much curved. It is largely grown for its excellent timber and as a good fuel tree.

2. *ACACIA DEALBATA*, Link. The Silver Wattle. A small

tree with silvery foliage of bipinnate leaves which do not change into phyllodes, yellow very sweet-scented panicles and heads of flowers and narrow pods, the sutures not or little constricted between the seeds. It is largely grown in coppice as a fuel, and the bark is a useful tan, not so valuable, however, as that of the very closely allied *A. decurrens*, Willd., which has also been planted to a small extent. It differs by the foliage not being silvery and the pods distinctly constricted between the seeds.

84. *Albizzia*, Durazz.

Trees or shrubs without thorns or prickles, rarely climbing. *Leaves* evenly bipinnate; pinnae even-pinnate; leaflets of various sizes; stipules usually small, sometimes large and foliaceous; stipels 0. *Flowers* in globose heads, rarely in spikes; peduncles distinct, axillary or in terminal panicles; bracts 2 or none; bracteoles under the flowers very small, caducous. *Calyx* campanulate or tubular, 5-lobed. *Petals* 5, connate in a funnel-shaped corolla. *Stamens* indefinite, monadelphous at the base, filaments long exserted; anthers very small. *Ovary* sessile or shortly stalked, many-ovuled; style filiform; stigma minute. *Pod* large, thin, flat, straight, continuous within, indehiscent or subdehiscent. *Seeds* ovate or orbicular, compressed, exalbuminous, the funicle filiform.

Flowers in globose heads; trees:—

Leaflets large, usually more than .75 in. long:—

Flowers sessile:—

Leaflets obliquely ovate, broad and rounded at base on the upper, narrower and attenuate on the lower side of the midrib, 1-1.5 in. long; .75-1 in. broad, slightly villous beneath; calyx tubular, glabrous, .1 in. long; pods thin, orange-brown, .8 in. broad1. *procera*.

Leaflets oblong, curved upwards, broadest on the lower side of the midrib, rounded or semicordate at base, .75-1 in. long, .25-.5 in. broad, pubescent beneath; calyx campanulate, .05 in. long, glabrous; pods moderately thick, brown, 1-1.5 in. broad.

2. *odoratissima*.

Flowers pedicelled:—

Leaflets broadly oblong, curved upwards, broadest on the lower side of the midrib, obtuse or retuse at apex, rounded at base, the end ones semicordate, slightly pubescent beneath, 1-2 in.

long, .5-75 in. broad; calyx tubular, .125 in. long, puberulous; pods thin, straw-coloured, 1-2 in. broad3. *Lebeck*.
 Leaflets oblong, slightly falcate, broadest on the lower side of the midrib, rounded or semicordate at base, appressed pubescent when young, ashy-grey when dry; .5 in. long, .2 in. broad; calyx campanulate, .05 in. long, puberulous; pods moderately thick, red, 1-1.5 in. broad4. *Thompsoni*.

Leaflets small, under .75 in. long.

Leaflets rounded at apex, the midrib nearly central, but slightly nearer the upper edge; pedicels short.

Leaflets broad, 1.5 in., half as broad as long, very grey-pubescent, base obliquely truncate on the upper, semicordate on the lower side; calyx tubular-campanulate, puberulous; pod thin, flat, .5-1 in. broad, brown5. *Lathamii*.

Leaflets narrow, .1 in., one-fourth as broad as long, glabrous or ciliate on the edges, attenuate on the upper, rounded on the lower side; calyx campanulate, puberulous; pod thin, flat, 1-1.25 in. broad, greyish-brown6. *amara*.

Leaflets acute at apex, falcate, semitruncate at base, the midrib close to the upper edge, .1 in. broad, ciliate on the margins and midrib; stipules large and conspicuous; pedicels very short; calyx funnel-shaped, pubescent; pod .75-1.5 in. broad, thin, pale-brown7. *marginata*.

Flowers in axillary spikes; leaflets very many, linear, acute, the midrib near the upper margin, villous on the midrib beneath; pods rather thick, with raised sutures, 3 in. by .5 in. *lophantha*.

1. ALBIZZIA PROCERA, Benth.; F. B. I. ii. 299; Brand. For. Fl. t. 26. *Mimosa procera*, Roxb. Cor. Pl. t. 121. *Acacia procera*, Willd.; W. & A. 275.

N. Circars and Deccan, in hill forests, not very common except along river banks; W. Gháts, in deciduous forests. Often planted for ornament or in avenues. White Siris.

A very large deciduous tree, conspicuous for its yellowish-white bark and head of spreading branches. Flowers greenish-white, rather small. Wood brown, hard, resembling walnut, useful for many purposes in building and agriculture. Vern. *Hind.* Safed siris; *Ur.* Sarapatiri, Sirsi; *Tel.* Tella chinduga; *Tam.* Konda vaghe; *Mal.* Karun thagara.

2. ALBIZZIA ODORATISSIMA, Benth.; F. B. I. ii. 299; Bedd.

Fl. t. 54. *Mimosa odoratissima*, Roxb. Cor. Pl. t. 120.
Acacia odoratissima, Willd.; W. & A. 275.

Mixed forests in all Forest Districts, up to 3,000 ft. in the hills.

A large tree, almost deciduous though never quite leafless, with sweet-scented white flowers with yellow anthers. Bark dark grey with irregular cracks; wood dark brown, hard and close-grained, useful for many purposes, especially for wheels, oilmills and furniture. Vern. *Hind.* Kala siris; *Ur.* Sirsi tentura; *Tel.* Chinduga; *Tam.* Karu vagei; *Mal.* Puli vaga.

var. *mollis*, Benth. Leaflets and leaf rhachises densely grey or tawny-velvety. Coimbatore forests (Cleghorn).

3. ALBIZZIA LEBBECK, Benth.; F. B. I. ii. 298; Bedd. Fl. t. 53.
Acacia speciosa, Willd.; W. & A. 275.

All plains Districts, cultivated and run wild, but doubtfully indigenous. Siris.

A large deciduous tree, with rather large white flowers and very long greenish stamens, the pods characteristic and long remaining on the tree when ripe. Bark brownish-grey; wood dark brown, streaked, hard and useful for building and agricultural purposes. Vern. *Hind.* Siris; *Ur.* Tinia; *Tel.* Dirasana; *Tam.* Vagei; *Mal.* Vága.

4. ALBIZZIA THOMPSONI, Brandis in Ind. For. xxv. 284.

N. Circars, in Ganjam forests; Deccan, in Cuddapah and Coimbatore, up to 3,000 ft.

A large deciduous tree with pale-yellow flowers and pink anthers. Vern. *Hind.* Sailari; *Tel.* Kondala.

5. ALBIZZIA LATHAMII, Hole in Ind. For. Records iv. 4. 153.

S. Carnatic, in Tinnevely and Ramnad, up to 1,200 ft. (Wight, Latham, Hole), in dry deciduous forest.

A much-branched small tree with purplish-red white-lenticellate bark, short leaves and small pods.

6. ALBIZZIA AMARA, Boivin; F. B. I. ii. 301; Bedd. Fl. t. 61.
Acacia amara, Willd.; W. & A. 274. *A. Wightii*, Grah.; W. & A. 274. *Mimosa amara*, Roxb. Cor. Pl. t. 122.

N. Circars, in Vizagapatam and Godavari; Deccan and Carnatic, in dry forest lands to S. Travancore and up to 3,000 ft.

A moderate-sized deciduous tree with pinkish-white flowers

and leaves with very many very small leaflets, the young shoots yellow-pubescent. The wood is purplish-brown with lighter bands, very hard and strong, used in building and agricultural work. Vern. *Tel.* Nalla renga; *Tam.* Wúnja; *Mal.* Varacchi.

7. *ALBIZZIA MARGINATA*, Merr. *A. stipulata*, Boiv.; F. B. I. ii. 300; Bedd. Fl. t. 55. *Acacia stipulata*, DC.; W. & A. 274.

N. Circars and Deccan, in hill forests; W. Gháts, in deciduous forests and up to 3,000 ft. or higher; sometimes planted as a shade tree for coffee.

A large deciduous tree with white flowers with pink filaments and leaves with very many falcate leaflets. Bark grey, horizontally furrowed; wood brown, soft, of less value than that of the other species. Vern. *Hind.* Siran; *Tel.* Konda chiragu; *Tam.* Pili vagei; *Mal.* Potta vaga.

Albizzia lophantha, Benth. is an Australian shrub, cultivated and run wild on the Nilgiris and Pulneys.

85. *Pithecolobium*, Mart.

Erect trees or shrubs, unarmed or with spinescent stipules or axillary spines. *Leaves* bipinnate, pinnae even-pinnate; stipules various; stipels 0. *Flowers* usually hermaphrodite, in globose heads on solitary fascicled or racemed peduncles, axillary at the ends of branches; bracts small; bracteoles under the calyx caducous or sometimes persistent. *Calyx* campanulate, shortly 5-toothed. *Petals* 5, rarely 6, connate in a tubular corolla with 5 valvate lobes. *Stamens* monadelphous, much exserted; anthers small. *Ovary* sessile or stalked, many-ovuled; style filiform; stigma minute. *Pod* strap-shaped, circinate or falcate, sometimes coriaceous, sometimes moniliform, usually dehiscent and much twisted, the sutures not thickened. *Seeds* ovate or orbicular, compressed, sometimes arillate.

Stipules spinose:—

Pinnae 1 pair, each with 1 pair of leaflets reaching 2 in. in length; flowers in close heads in long narrow terminal panicles; pods twisted, coriaceous, the seeds with a white edible aril..... 1. *dulce*.
Pinnae 1-2 pairs, each with 5-8 pairs of oblong leaflets reaching 75 in. in length; flowers in axillary heads on long peduncles; pods curved, not twisted, thick, with 6-8 moniliform rounded joints with flat circular seeds..... 2. *umbellatum*.

Unarmed :—

Leaflets numerous, small, trapezoid, coriaceous, tawny-villous beneath, the margins incurved, .3-.5 in. long, glands many, 1-3 on the petiole, 1 half-way between each pair of the 3-12 pairs of pinnae; calyx and corolla golden-pubescent; pod 3-4 in. long, curved in a circle, orange within with 4-7 black seeds

3. *subcoriaceum*.

Leaflets few, large, 1-4 pairs; glands 1 on the petiole, 1 each at the base of each pinna and leaflet; bracteoles lanceolate, persistent:—

Pinnae 1-2 pairs, leaflets up to 4 pairs, lanceolate, acuminate, glabrous, black when dry, reaching 7 in. long, 2 in. broad, unequal at base; calyx campanulate, .075 in. long; corolla twice as long, lobes recurved; pod spirally curved, the valves .5-.7 in. broad, red within.....4. *bigeminum*.

Pinnae 1 pair, leaflets 1-3 pairs, ovate, abruptly caudate-acuminate, glabrous, reticulate, green when dry, reaching 6 in. long, 3 in. broad, nearly equal at base; calyx short-campanulate, .05 in. long; corolla twice as long, lobes spreading.....5. *gracile*.

1. *PITHECOLOBIUM DULCE*, Benth.; F. B. I. ii. 302; Bedd. Fl. t. 188. *Mimosa dulcis*, Roxb. Cor. Pl. t. 99. *Inga dulcis*, Willd.; W. & A. 268; Wt. Ic. t. 198.

All dry plains Districts, cultivated as a hedge plant and run wild, native of tropical America.

A tree which, when allowed to grow, reaches a good size and gives a useful strong reddish-white wood, a good fuel, pods which are eaten by cattle and foliage which is eaten by goats. It makes a good strong hedge. Vern. *Tam.* Karkapilly.

2. *PITHECOLOBIUM UMBELLATUM*, Benth.; F. B. I. ii. 303. *Inga umbellata*, W. & A. 270.

Eastern Districts (Wight, Cleghorn) scarce.

A low tree with thick moniliform pods, and heads of rather few pedicelled creamy-white flowers with very long stamens, thorns scarce. Vern. *Tam.* Iyamalai.

3. *PITHECOLOBIUM SUBCORIACEUM*, Thw.; F. B. I. ii. 305. *P. anamallayanum*, Bedd. Fl. t. 189.

W. Ghâts, in the Anamalais and the Hills of Travancore above 4,000 ft., in evergreen forests.

A small tree with pretty greenish-white flowers, foliage and pods. Wood yellowish, soft. Vern. *Tam.* Malei vágei.

4. *PITHECOLOBIUM BIGEMINUM*, Mart.; F. B. I. ii. 303. *Inga bigemina*, Willd.; W. & A. 269.

W. Gháts, in evergreen forests up to 3,000 ft. from Mysore to Anamalais and Travancore, common in Wynaad; W. Coast, in S. Canara.

A small tree with white flowers and broad flat pod curved in a ring and orange-red inside with black seeds. Bark smooth, brown, thin; wood light brown, soft. Vern. *Tum.*

Kal pakku; *Mal.* Mutha kolappan.

5. *PITHECOLOBIUM GRACILE*, Bedd. in Madr. Journ. Sc. 1864, 44; Brand. Ind. Trees 274.

W. Gháts, in the Wynaad forests at 3,000 ft. (Beddome, Gamble); Coorg (Bourne).

A slender shrub or small tree with white flowers and long caudate points to the leaflets.

Enterolobium Saman, Prain, the Rain tree is an introduction from S. America, and is often grown as an avenue tree. Its growth is very fast, but the wood is useless.

86. *Inga*, Willd.

Trees or shrubs. *Leaves* simply pinnate. *Flowers* in spikes or globose heads, peduncled. *Calyx* tubular or campanulate, shortly 3-5-toothed. *Petals* combined in a tubular or funnel-shaped corolla with 3-5 lobes, the lobes valvate. *Stamens* indefinite, long-exserted, monadelphous; anthers minute. *Ovary* sessile, many-ovuled; style filiform; stigma minute. *Pod* linear, coriaceous, straight or curved, the sutures usually thickened. *Seeds* obovate or orbicular, compressed, sometimes with a pulpy aril.

INGA CYNOMETROIDES, Bedd.; F. B. I. ii. 306. *Calliandra cynometroides*, Bedd. Fl. t. 317.

W. Gháts, in the Hills of S. Travancore in evergreen forest at 2,500-3,500 ft. (Beddome).

A middle-sized glabrous tree with thorny branches, having 1 pair of leaflets 3-4 in. long, flowers with 3-lobed calyx and corolla and flat glabrous coriaceous pod much thickened at the sutures.

Family LYI. ROSACEAE.

Herbs, shrubs or trees. *Leaves* alternate, rarely opposite, simple or compound; stipules free or adnate to the petiole,

rarely 0. *Flowers* usually regular and hermaphrodite. *Calyx-tube* free or adnate to the ovary, usually 5-lobed, often bracteolate. *Disk* lining the calyx-tube or forming a ring at its base. *Petals* 5, rarely 0, inserted under the margin of the disk, usually imbricate. *Stamens* perigynous, usually indefinite, in one or more series; filaments generally incurved in bud; anthers small, didymous. *Ovary* of one or more free or connate carpels; ovules 1 or more in each carpel; styles basal lateral or subterminal, free or connate; stigmas simple, penicillate or capitate. *Fruit* variable, of achenes berries or drupes, rarely capsular. *Seeds* erect or pendulous, exalbuminous; testa membranous or coriaceous; cotyledons plano-convex; radicle short.

Ovary superior; the ripe carpels not enclosed in the calyx-tube:—

Flowers irregular; ovules 2, ascending; carpel 1, style basal

1. **Parinarium.**

Flowers regular; ovules 2, pendulous:—

Carpel 1:—

Drupe erect; style terminal:—

Petals large; endocarp hard, bony.....**Prunus.**

Petals very small; endocarp coriaceous2. **Pygeum.**

Drupe inverted; style subbasal; endocarp coriaceous

Prinsepia.

Carpels many:—

Ovules 2; pendulous; calyx ebracteolate; prickly shrubs:—

3. **Rubus.**

Ovule 1, erect; calyx bracteolate; herbaceous plants:—

Achenes on a fleshy receptacle.....4. **Fragaria.**

Achenes on a dry receptacle5. **Potentilla.**

Ovary inferior; the ripe carpels enclosed in the calyx-tube:—

Carpel 1; petals 0; herbaceous.....6. **Alchemilla.**

Carpels more than 1; petals present; trees or shrubs:—

Carpels not confluent when ripe; prickly shrubs with compound leaves and adnate stipules.....7. **Rosa.**

Carpels confluent when ripe; erect unarmed trees or shrubs with simple leaves and small stipules:—

Flowers in panicles; ovary 5-celled.....**Eriobotrya.**

Flowers corymbose or fascicled:—

Ovary 5-celled; endocarp cartilaginous.....**Pyrus.**

Ovary 2-3-celled; endocarp thin; evergreen trees

8. **Photinia.**

Ovary 2-5-celled; endocarp bony; rigid shrubs

9. **Cotoneaster.**

1. *Parinarium*, Juss.

Trees. *Leaves* simple, alternate, evergreen, quite entire; stipules subulate or lanceolate. *Flowers* hermaphrodite, white or pink, in corymbose racemes, bracteate. *Calyx*-tube campanulate or funnel-shaped; lobes 5, imbricate. *Petals* 5, inserted on the mouth of the calyx-tube, sessile or clawed, deciduous. *Stamens* numerous; filaments connate at the base in a ring or unilateral bundle, filiform; anthers small. *Ovary* adnate to the side of the calyx-tube, 2-celled, the ovules erect; style basal, filiform; stigma truncate. *Fruit* an ovoid or spherical drupe, the stone 1-2-seeded, woody or bony. *Seeds* erect; testa membranous; cotyledons fleshy.

Leaflets 8-9 in. long, 3 in. broad, elliptic-lanceolate, glabrous racemes stout, axillary or terminal, slightly pubescent, about 4 in. long; flowers white 1. *indicum*.

Leaves 4-5 in. long, 1-1.5 in. broad, lanceolate, glabrous except the silky midrib beneath; racemes slender, drooping, usually axillary, silky-villous, about 2 in. long; flowers pink 2. *travancoricum*.

1. *PARINARIUM INDICUM*, Bedd. Ic. t. 109, Fl. t. 191; F. B. I. ii. 311.

W. Gháts, about the Carcoor Ghát, S.-E. Wynaad, in moist woods at 2,000-3,000 ft. (Beddome).

A middling-sized evergreen tree.

2. *PARINARIUM TRAVANCORICUM*, Bedd. Ic. t. 189; F. B. I. ii. 311.

W. Gháts, in the Travancore Hills, in evergreen forests at 2,000 ft. (Beddome, Bourdillon).

A small graceful evergreen tree with straight cylindric stem. Bark smooth, mottled brown and white; wood hard, smooth, pink.

2. *Pygeum*, Gaertn.

Evergreen shrubs or trees. *Leaves* simple, alternate, persistent, entire or rarely toothed, sometimes with pitted glands near the base; stipules small, deciduous. *Flowers* small, in racemes, sometimes ♂ only by suppression of the ovary; bracts deciduous, in early bud forming a cone. *Calyx*-tube obconic urceolate or campanulate, usually villous within, deciduous usually in a ring

at the middle; lobes 5-6, very small. *Petals* 5-6, sometimes undistinguishable from the calyx-lobes with which they alternate, usually villous. *Stamens* normally 10, 20 or 30, in one or two rows, often irregular by the absence of some; filaments slender, incurved; anthers small. *Carpel* solitary at the base of the calyx-tube, ovoid or globose; style subulate; stigma capitate; ovules 2, collateral, pendulous. *Fruit* a transversely oblong obscurely 2-lobed indehiscent drupe; pericarp thin, dry or fleshy; cotyledons hemispheric; radicle minute, superior.

Leaves entire:—

Calyx-lobes and petals unequal, the latter the longer:—

Leaves ovate to broad-lanceolate, acuminate at apex, 4-6 in. long, 1.5-3 in. broad, not pitted; racemes slender, 2-3 in. long, pedicels .1 in.; stamens more than 30 with long filaments; ovary glabrous with long slender style; drupe .5 by .7 in., dark purple, top slightly retuse.....1. *acuminatum*.

Leaves lanceolate, acute at apex, 2-4 in. long, 1-1.5 in. broad, rarely pitted; racemes under 2 in. long, pedicels .1 in.; stamens about 20 with short filaments; ovary glabrous with short style; drupe .5 by .8 in., purple, top slightly retuse 2. *sisparense*.

Leaves ovate, obtusely acute at apex, rounded or subcordate at base and usually pitted; 4-6 in. long, 2.5-3 in. broad; racemes reaching 5 in. long, pubescent, pedicels .1-.25 in. long; stamens about 20; ovary glabrous, with thick style; drupe .6 by .7 in., top not retuse.....3. *Wightianum*.

Calyx-lobes and petals nearly equal, similar, but the latter more obtuse; stamens normally 30; racemes 2-4 in. long, pubescent, pedicels .1 in.; leaves lanceolate, long acuminate, up to 7 in. long, 2-3 in. broad; basal glands present or more often absent; drupe .6 by 1 in., black, slightly retuse at top..... 4. *Gardneri*.

Leaves crenate-serrate, ovate or ovate-oblong, attenuate at base; petals oblong, .1 in. long, glandular-ciliate, twice the length of the calyx-lobes; stamens 10-15, usually 10..... 5. *Andersoni*.

1. *PYGEUM ACUMINATUM*, Coleb. in Trans. Linn. Soc. xii. 360, t. 18; F. B. I. ii. 318.

E. Gháts, Rumpa Hills of Godavari at 2,500 ft. (Gamble).

An evergreen tree, with fairly large leaves.

2. *PYGEUM SISPARENSE*, Gamble in Kew Bull. 1918, 238.

W. Gháts, about Sispara in W. Nilgiris at 6,000-7,000 ft. (Gamble).

A small tree with small leaves racemes and flowers, the fruit large.

3. PYGEUM WIGHTIANUM, Bl.; F. B. I. ii. 319. *P. ceylanicum*, Bedd. Fl. t. 59.

W. Gháts, from Mysore to the Nilgiris, Pulneys and Travancore Hills, at 3,000–6,000 ft.

A large and handsome tree with white flowers, the leaves, fruit and bark smelling of prussic acid. Bark dark brown, rough; wood hard, pink, mottled and streaked. Vern. *Tam.* Palan kacchi; *Mal.* Nai kambagam.

4. PYGEUM GARDNERI, Hook. f. in F. B. I. ii. 321. *P. acuminatum*, Wt. Ic. t. 993.

W. Gháts, in the hills of Malabar, Nilgiris, Pulneys and Travancore, above 3,000 ft.

A medium-sized tree, glabrous except the inflorescence, the leaf-glands only occasionally found.

5. PYGEUM ANDERSONI, Hook. f. in F. B. I. ii. 320.

E. Gháts, Mahendragiri Hill in Ganjam at 4,500 ft. (Gamble, Fischer).

A tree or shrub, noticeable for its serrate leaves, glabrous except the margins of the rather long petals.

3. Rubus, Linn.

Creeping herbs or erect or climbing shrubs, usually prickly. *Leaves* alternate, simple or compound; stipules free or adnate to the petiole. *Flowers* in terminal or axillary corymbose panicles, rarely solitary, white or red; bracts various; bracteoles usually small or 0. *Calyx*-tube broad; lobes 5, persistent. *Disk* lining the calyx-tube. *Petals* 5. *Stamens* many, inserted on the mouth of the calyx-tube. *Carpels* many, on a convex receptacle; ovules 2, collateral, pendulous; style subterminal, filiform; stigma capitate. *Fruit* a cluster of small fleshy 1-seeded drupes crowded on the receptacle, rarely few. *Seed* pendulous; cotyledons plano-convex; radicle superior.

Leaves simple, 5-lobed, the under-surface, the nerves on the upper surface, the branchlets and inflorescence more or less clothed with white or fulvous tomentum; prickles comparatively few, short, recurved:—

Bracts boat-shaped or obovate, entire or dentate at apex; leaves up to 4 in. long, 3 in. broad, the lobes short, acute, again lobulate

1. *Wightii*.

Bracts broadly ovate or obovate, laciniate at apex:—

Leaves thick, deeply cordate, prominently and minutely rugose on both surfaces with very small areoles; bracts and stipules long-flabellately laciniate:—

Leaves orbicular in outline, up to 6 in. in diam., the lobes rounded, scarcely lobulate, the sinuses shallow; tomentum thick, fulvous; inflorescence dense...2. *rugosus* var. *Thwaitesii*.

Leaves ovate in outline, up to 9 in. long by 7 in. broad, the lobes acute, the end one long and usually again lobulate; tomentum short, white or pale fulvous; inflorescence loose

3. *Fairholmianus*.

Leaves thin, shallowly cordate, not minutely rugose, up to 6 in. long by 5 in. broad, the areoles rather large; bracts and stipules shortly laciniate; tomentum very thin, tawny; inflorescence lax

4. *Gardnerianus*.

Bracts pectinately laciniate with linear segments; leaves deeply cordate, not lobulate, rugose with small areoles:—

Petals very small, less than half the length of the calyx-lobes; leaves up to 5 in. long by 4.5 in. broad, the lobes, especially the end one, acute, the sinuses deep; inflorescence short or shortly paniculate5. *micropetalus*.

Petals nearly as long as the calyx-lobes; leaves up to 6 in. in diam., the lower lobes rounded or subacute, the end lobe acute; inflorescence large, in spreading panicles6. *fulvus*.

Leaves pinnately 3-foliolate, wrinkled, the end leaflet the largest; stipules subulate; petals white, as long as or longer than the calyx-lobes; fruit globose, orange7. *ellipticus*.

Leaves pinnately 5-7 foliolate, usually white beneath:—

Branches glabrous, glaucous, not glandular; leaves usually 7-foliolate, stipules subulate; petals pink, shorter than the calyx-lobes; fruit globose, black with white tomentum.....8. *niveus*.

Branches covered with glandular bristles and hairs; leaves usually 5-foliolate, stipules lanceolate; petals red, longer than the calyx-lobes; fruit globose, purple with white tomentum.....9. *racemosus*.

1. *RUBUS WIGHTII*, Gamble. *R. rugosus*, Wt. Ic. t. 225 not of Sm. *R. moluccanus*, Hook. f. in F. B. I. ii. 330 in part only (var. *a*. Thwaites Enum. Pl. Zeyl.).

Sivagiri hills, Tinnevely (Wight).

A small species with pretty vine-like leaves and red fruits.

2. RUBUS RUGOSUS, Sm. in Rees Cycl. xxx. *R. moluccanus*, Linn.; F. B. I. ii. 330 *in part*.
 Var. *Thwaitesii*, Focke. W. Gháts, in the Nilgiri Hills at high levels, common on Dodabetta at 8,000 ft.
 A large strongly-growing shrub with large purple-black fruits.
3. RUBUS FAIRHOLMIANUS, Gardn. in Calc. Journ. Nat. Hist. viii. 6. *R. moluccanus*, Hook. f. in F. B. I. ii. 330 *in part only* (var. γ . Thwaites Enum. Pl. Zeyl.).
 W. Gháts, in the Pulney Hills at 5,000–7,000 ft.
 A large shrub with white tomentum and red fruits.
4. RUBUS GARDNERIANUS, O. Kze. *R. moluccanus*, Hook. f. in F. B. I. ii. 330 *in part only* (var. δ . Thwaites Enum. Pl. Zeyl.). *R. macrocarpus*, Gardn.
 W. Gháts, at Udambadsholay, Travancore Hills, at 5,000 ft. (Meebold); E. Gháts, Madgol Hills of Vizagapatam at 4,500 ft. *probably*.
 A good-sized shrub with thin leaves, open reticulations to the leaves, many prickles and black fruit.
5. RUBUS MICROPETALUS, Gardn. in Calc. Journ. Nat. Hist. viii. 6. *R. moluccanus*, Hook. f. in F. B. I. ii. 330 *in part only* (var. β . Thwaites Enum. Pl. Zeyl.).
 Tinnevely District, at Kalivayalpil (Barber).
 Apparently a small species, perhaps climbing, with deeply-lobed leaves, small petals and red fruit.
6. RUBUS FULVUS, Focke in Biblioth. Bot. lxxii. 81 (1909).
 W. Gháts, in W. Nilgiris, Bababudan Hills of Mysore, Atapadi Hills of Malabar, hills of Coimbatore, at 3,000–6,000 ft. (King, Fischer and others).
 A strong-growing, perhaps climbing, species with large flower panicles and black-purple fruit.
7. RUBUS ELLIPTICUS, Sm.; F. B. I. ii. 336. *R. Gowreephul*, Roxb.; W. & A. 298; Wt. Ic. t. 230. *R. Wallichianus*, W. & A. 298; Wt. Ic. t. 231.
 N. Circars and Deccan, in the hills above 4,000 ft.; W. Gháts, in all Districts, in open places, usually above 6,000 ft.
 A large straggling shrub with stiff red hairs and prickles. The orange raspberry-like fruit is edible and good, it can be made into preserves.

8. *RUBUS NIVEUS*, Thunb. Dissert. 9, fig. 3 *not of* Wall. *R. lasiocarpus*, Sm.; F. B. I. ii. 339; W. & A. 299; Wt. Ic. t. 232.

N. Circars, Deccan and Carnatic, in hills above 4,000 ft.; W. Gháts, in all Districts, on Shola margins and in open forest.

A straggling shrub, the leaves usually very white beneath; fruit edible but dry and the seeds with a woolly coat.

- Var. *subglaber*, Thw. Leaves not white beneath, glabrous except on the nerves; thorns large, recurved from broad bases.

Nilgiri and Pulney Hills, at high elevations.

9. *RUBUS RACEMOSUS*, Roxb.; F. B. I. ii. 340.

Nilgiri hills, at high elevations, above 6,000 ft.

A straggling shrub very closely allied to *R. niveus*, chiefly differing in the glandular hairs, especially on the calyx-tube.

Rubus Idueus, Linn., the Raspberry, is found in cultivation in hill stations.

4. *Fragaria*, Linn.

Perennial scapigerous herbs with creeping stolons. *Leaves* digitately 3- rarely 5-foliolate, rarely pinnate or simple; stipules adnate to the petiole. *Flowers* white or yellow, often polygamous, cymose on erect scapes; bracts leafy; bracteoles 5, close under the calyx. *Petals* 5. *Stamens* many, 1-seriate, persistent; filaments filiform; anthers didymous. *Carpels* many, on a convex receptacle; styles lateral; ovules 2, collateral, pendulous. *Fruit* of many achenes, sunk in the surface of the fleshy receptacle. *Seeds* minute; cotyledons plano-convex; radicle superior.

Flowers yellow, solitary, bracteoles broad, 3-5-fid at apex; leaflets 3-5, obovate, usually crenate; peduncles shortly whitish-villous, .25-1 in. long; slender plants with the ripe receptacles red...1. *indica*. Flowers white, in cymes, bracteoles deeply bifid in 2 lanceolate lobes; leaflets 3, obovate, coarsely dentate; peduncles densely golden-villous, 1-1.5 in. long; robust plants with the ripe receptacles white tinged with pink.....2. *nilgerrensis*.

1. *FRAGARIA INDICA*, Andr.; F. B. I. ii. 343; W. & A. 300; Wt. Ic. t. 989.

W. Gháts, Nilgiri and Pulney Hills at 6,000–7,000 ft.

A small creeping strawberry, the fruit insipid.

2. *FRAGARIA NILGERRENSIS*, Schlecht.; F. B. I. ii. 344. *F. elatior*, W. & A. 300; Wt. Ic. t. 938.

W. Gháts, Nilgiri and Pulney Hills, above 6,000 ft.

A stout creeping wild strawberry, the fruit edible and pleasant.

Fragaria elatior, Ehrh., the Strawberry, is cultivated in hill gardens.

5. *Potentilla*, Linn.

Herbs or rarely shrubs, perennial or sometimes annual. *Leaves* digitately or pinnately compound, the leaflets usually lobed; stipules adnate to the petiole. *Flowers* white or yellow, rarely red, solitary or in corymbose cymes; bracts leafy; bracteoles 5, rarely 4, under the calyx. *Calyx* persistent, tube hemispheric or urceolate, concave at base; lobes 5, rarely 4, valvate. *Petals* 5. *Stamens* many, 1- or more-seriate, rarely definite. *Carpels* many, on a small dry receptacle; ovule solitary, pendulous; style persistent or deciduous, ventral or terminal. *Fruit* of many achenes, clustered on the dry receptacle. *Seeds* minute; radicle superior.

Leaves pinnate with 5–7 obovate coarsely-toothed leaflets, whitish beneath, softly golden-villous; flowers about .5 in. in diam.; achenes smooth or very minutely wrinkled, pale, about .1 in. long

1. *Leschenaultiana*.

Leaves digitately 5-foliolate, leaflets obovate or oblanceolate, silky-villous, green beneath, obtusely deeply crenate; flowers about .25 in. in diam.; achenes dark, deeply wrinkled, scarcely .05 in. long

2. *Kleiniana*.

1. *POTENTILLA LESCHENAULTIANA*, Ser.; F. B. I. ii. 350; W. & A. 301; Wt. Ic. t. 990.

W. Gháts, in the Nilgiri and Pulney Hills, above 6,500 ft.

A strong-growing perennial herb with yellow flowers.

2. *POTENTILLA KLEINIANA*, W. & A. 300; F. B. I. ii. 359; Wt. Ill. t. 85.

W. Gháts, in the Nilgiri Hills about Ootacamund at 7,000 ft.

A weak, usually prostrate herb with yellow flowers, sometimes stoloniferous.

6. *Alchemilla*, Linn.

Annual or perennial herbs. *Leaves* alternate, orbicular, lobed or deeply divided; stipules adnate to the petiole, sheathing the stem. *Flowers* minute, in corymbose cymes; bracts many; bracteoles 4-5, under the calyx-lobes. *Calyx*-tube campanulate, lobes 4-5, valvate. *Disk* adnate to the calyx-tube, large and thick at its mouth. *Stamens* 4-5, on the mouth of the calyx-tube. *Carpels* 1-5, stalked or sessile in the calyx-tube; style basal; stigma capitate. *Fruit* of 1-4 achenes enclosed in the membranous persistent calyx-tube.

ALCHEMILLA INDICA, Gardn.; F. B. I. ii. 361. *A. vulgaris*, Wt. Ic. t. 229.

Nilgiri and Pulney Hills, above 7,000 ft., chiefly at high elevations as on the top of Dodabetta, on open grass-land.

A perennial silky herb with prostrate stems covered with the dry remains of the stipules; flowers very small, green; leaves orbicular, 7-11-lobed, serrate.

7. *Rosa*, Linn.

Erect, sarmentose or climbing shrubs, usually prickly. *Leaves* alternate, imparipinnate; leaflets serrate; stipules adnate to the petiole. *Flowers* terminal, solitary or corymbose, white, yellow or red; bracts rarely persistent; bracteoles 0. *Calyx*-tube globose, ovoid or flask-shaped, the mouth contracted; lobes 4-5, imbricate. *Petals* 4-5, usually large. *Disk* lining the calyx-tube, thickened in a ring at the mouth. *Stamens* many, inserted on the disk. *Carpels* many, rarely few, in the bottom of the calyx-tube; styles subterminal, free or connate above; stigma thickened; ovule solitary, pendulous. *Fruit* a fleshy calyx-tube (rose-hip) enclosing a cluster of coriaceous or bony achenes. *Seeds* small, pendulous; cotyledons plano-convex; radicle superior.

ROSA LESCHENAULTIANA, W. & A. 301; F. B. I. ii. 368; Wt. Ic. t. 38.

W. Gháts, in the Nilgiri Hills above 5,000 ft., in Shola Forest; said to occur also in the Pulney Hills.

A large climbing shrub with pink flowers, very glandular leaf-rhachises and peduncles and globose fruit, the styles

united in a long-exserted column. Bark papery, purplish-red; wood reddish-brown.

Roses, of many species and garden varieties, are to be found in cultivation, especially in the Hills.

8. Photinia, Lindl.

Evergreen trees or shrubs. *Leaves* simple, coriaceous, entire or toothed; stipules subulate, deciduous. *Flowers* small, white, in corymbose terminal panicles; bracts deciduous. *Calyx*-tube obconic; lobes 5, short, persistent. *Petals* 5, spreading. *Stamens* 20, inserted on the mouth of the calyx. *Ovary* half-adhering, 2-rarely more-celled; styles 2, rarely more, free or connate at the base; stigmas truncate; ovules 2 in each cell, collateral, ascending. *Fruit* a small globose or ovoid drupe with 2 pyrenes each in a crustaceous endocarp, each with 2 seeds. *Seeds* obovoid, triquetrous or compressed; testa coriaceous; cotyledons plano-convex; radicle inferior.

Leaves elliptic—ovate or—lanceolate, mucronate at apex, crenulate, 3-6 in. long, the nerves prominent beneath; flowers 3 in. broad, the claw of the petals usually villous; seeds triquetrous ... 1. *Lindleyana*. Leaves elliptic or obovate, obliquely acuminate at apex, entire, 3-6 in. long, 1-2.5 in. broad, nerves not prominent; flowers 1.5 in. broad, the claw of the petals usually glabrous; seeds compressed

2. *Notoniana*.

1. PHOTINIA LINDLEYANA, W. & A. 302; F. B. I. ii. 380; Wt. Ic. t. 228.

W. Gháts, in Shola Forests of the Nilgiri Hills at about 6,000 ft.

A small tree with dark brown bark and light brown close-grained wood, used only for fuel.

- var. *tomentosa*, Gamble. Petioles, undersurface of young leaves and inflorescence softly tawny-tomentose; leaves almost entire, serrate towards the apex.

Nilgiris, chiefly in Sholas towards Sispara at and above 7,000 ft.

2. PHOTINIA NOTONIANA, W. & A. 302; F. B. I. ii. 380; Wt. Ic. t. 991; Ill. t. 86; Bedd. Fl. t. 192.

W. Gháts, in the Nilgiri and Pulney hills and the hills

of Malabar and Travancore above 4,000 ft., in evergreen forests.

A good-sized tree with reddish-brown scaly bark and light red close-grained wood.

9. *Cotoneaster*, Rupp.

Small trees or shrubs, erect or decumbent. *Leaves* alternate, simple, usually downy beneath; stipules subulate, deciduous. *Flowers* small, solitary or in axillary or terminal cymes, white or pink; bracts and bracteoles small. *Calyx*-tube turbinate or campanulate; lobes 5, short, persistent. *Petals* 5, imbricate in bud. *Stamens* indefinite, usually 20, inserted at the mouth of the calyx. *Carpels* 2-5, adnate to the calyx-tube; styles free; stigma truncate; ovules 2 in each cell, erect. *Fruit* an ovoid globose or turbinate drupe with 2-5 1-seeded bony pyrenes. *Seeds* compressed, cotyledons plano-convex; radicle inferior.

COTONEASTER BUXIFOLIA, Wall.; F. B. I. ii. 387; W. & A. 302; Wt. Ic. t. 992.

W. Gháts, Nilgiri and Pulney Hills, above 5,000 ft.

A rigid, intricately branched shrub with elliptic-ovate acuminate apiculate small leaves, tomentose beneath, white flowers and scarlet fruit. Beddome says the hard, tough wood is used by the Todas to make clubs for killing buffaloes.

Prunus Persica, Benth. and Hook. f., the Peach; *Prunus Avium*, Linn., the Cherry; *Pyrus Malus*, Linn., the Apple; *Pyrus communis*, Linn., the Pear, are cultivated in hill stations for their fruit.

Prinsepia utilis, Royle, a thorny shrub, introduced from the Himalaya, is now found run wild in the Nilgiri Hills.

Eriobotrya japonica, Lindl., the Loquat, is occasionally cultivated in the Nilgiri Hills for its fruit.

Family LVII. SAXIFRAGACEAE.

Trees, shrubs or herbs. *Leaves* alternate with stipules adnate to the petiole or 0, or opposite exstipulate. *Flowers* usually hermaphrodite, regular. *Calyx* usually 5-merous, more or less

adnate to the ovary; lobes imbricate or valvate. *Disk* cup-like or sometimes reduced to intra-staminal glands. *Petals* usually 5, rarely 0, usually perigynous, imbricate or valvate. *Stamens* inserted with the petals, equalling or double their number, rarely indefinite. *Carpels* usually 2, less often 3-5, united in a usually 2-, rarely 3-5-celled ovary, with axile placentas, sometimes 1-celled with parietal placentas; ovules many; stigmas capitate or lateral subcapitate. *Fruit* an indehiscent capsule or an indehiscent berry. *Seeds* usually numerous, albuminous.

Placentas pendulous from the apex of the 1-celled ovary; dichotomous herbs with opposite leaves; staminodes none, stamens 5 .. 1. **Vahlia**. Placentas parietal; scapigerous herbs with radical leaves; staminodes alternating with the 5 stamens 2. **Parnassia**.

1. **Vahlia**, Thunb.

Annual or biennial herbs. *Leaves* opposite, entire; stipules 0. *Flowers* small, regular, axillary, usually in pairs, white or yellowish. *Calyx*-tube hemispheric, adnate to the ovary; lobes 5, valvate. *Petals* 5, epigynous, short. *Stamens* 5, inserted on the margin of the epigynous disk; filaments subulate. *Ovary* inferior, 1-celled, with 2 pendulous placentas; ovules many; styles 2; stigmas capitellate. *Fruit* a capsule dehiscing at the apex between the styles. *Seeds* many, minute, ellipsoid, smooth.

Flowers subsessile, 2- or often 1-flowered in most of the upper axils; filaments with a small hairy scale at their base 1. *viscosa*. Flowers peduncled, 2- or rarely 1-flowered in most of the upper axils; filaments without a scale at their base..... 2. *oldenlandioides*.

1. **VAHLIA VISCOSA**, Roxb.; F. B. I. ii. 399; W. & A. 364; Wt. Ic. t. 563.

Deccan and Carnatic, on dry lands.

2. **VAHLIA OLDENLANDIODES**, Roxb.; F. B. I. ii. 399; W. & A. 364; Wt. Ic. t. 562.

Deccan and Carnatic, on sandy lands, especially near the sea.

2. **Parnassia**, Linn.

Glabrous, perennial, scapigerous herbs, the scapes 1-flowered, usually with a leaflike bract in the middle. *Leaves* entire,

radical, petioled. *Calyx*-tube free or adnate to the ovary; lobes 5, imbricate. *Petals* 5, white or pale yellow. *Stamens* 5, perigynous or nearly hypogynous, opposite the calyx-lobes, alternating with 5 staminodes opposite the petals; filaments subulate; anthers ovate. *Ovary* 1-celled, ovoid; style short; stigmas 3-4; ovules numerous, on parietal placentas opposite the stigmas. *Fruit* a capsule, loculicidally 3-4-valved. *Seeds* numerous, smooth, albumen scarcely any.

Scapes 6-12 in. high; leaves broadly ovate, cordate, 1-1.5 in. long; petals obovate, conspicuously fimbriate on the margins; staminodes 3-5-lobed, the lobes cylindric-clavate.....1. *Wightiana*.

Scapes 3-6 in. high; leaves orbicular, cordate, .5-.75 in. long; petals obovate, not or slightly fimbriate on the margins; staminodes clavate, entire or more or less 3- or even 5-lobed2. *mysorensis*.

1. *PARNASSIA WIGHTIANA*, Wall. in W. & A. 35; F. B. I. ii. 402; Wt. Ill. t. 21, Ic. t. 945.

Boggy places on the Nilgiri plateau at 6,000-8,000 ft.

2. *PARNASSIA MYSORENSIS*, Heyne in W. & A. 35; F. B. I. ii. 402; Wt. Ill. t. 21.

W. Gháts, in the Mysore, Malabar, Nilgiri and Pulney Hills, above 5,000 ft., in damp places or among rocks. The Nilgiri specimens have the staminodes more prominently lobed than those from the Pulneys. The two species are closely allied and are more distinguishable by the difference of size than by other characters.

Family LYIII. CRASSULACEAE.

Herbs, with often a woody rootstock, or undershrubs, usually succulent. *Leaves* alternate or opposite, simple or sometimes pinnate; stipules 0. *Flowers* regular, hermaphrodite or unisexual, usually in cymes. *Calyx* free, 4-5-, rarely 6-8-lobed. *Petals* as many as the calyx-lobes and alternate with them, free or connate. *Stamens* as many or twice as many as the petals, hypogynous or epipetalous. *Carpels* as many as and opposite to the petals, free or connate below, narrowed into the styles with a hypogynous scale at the base of each; ovules numerous, 2-many-seriate, rarely few. *Fruit* of usually 4-5, rarely fewer, follicles dehiscing at the ventral suture. *Seeds* many, rarely few or solitary, albuminous.

Stamens as many as the petals; leaves opposite; small herbs

1. **Tillaea.**

Stamens twice as many as the petals; tall erect fleshy herbs:—

Calyx with a long inflated tube and shortly 4-fid limb; corolla with a much constricted tube; leaves bulbiferous in the crenatures, opposite, sometimes pinnate **Bryophyllum.**

Calyx with a short tube and deeply 4-partite limb; corolla with a flask-shaped tube; leaves opposite or the upper alternate, sometimes pinnatifid, not bulbiferous 2. **Kalanchoe.**

1. **Tillaea**, Linn.

Small glabrous herbs. *Leaves* opposite, entire. *Flowers* minute, axillary, solitary or fascicled or cymose, white or red. *Calyx* 4-5-lobed. *Petals* 4-5, free or connate at the base. *Stamens* 4-5, filaments filiform. Hypogynous *scales* 4-5 or 0. *Carpels* 4-5, free; styles short; stigmas minute. *Follicles* 2-many-seeded, rarely 1-seeded.

TILLAEA PENTANDRA, Royle; F. B. I. ii. 412.

Deccan, in Mysore (Lobb); Nilgiris (Hohenacker), usually on walls or rocks.

A small tufted plant with angular stem, stem-clasping leaves and minute scarious flowers.

2. **Kalanchoe**, Adans.

Erect perennial herbs with stout fleshy stems and leaves. *Leaves* opposite or the upper alternate, entire crenate or pinnatifid. *Flowers* large, erect, in many-flowered paniculate bracteate cymes. *Calyx* 4-partite or 4-fid half way down, shorter than the corolla. *Petals* 4, connate in a flask-shaped corolla tube, the lobes spreading, persistent. *Stamens* 8, in 2 series, adnate to the corolla-tube. Hypogynous *scales* 4. *Carpels* 4, adnate to the base of the corolla-tube, attenuate into long subulate styles; stigmas obliquely truncate; ovules many. *Follicles* 4. *Seeds* very many, oblong-ellipsoid, ribbed longitudinally.

Calyx divided not more than half-way down; leaves obovate, nearly entire, up to 6 in. long, much narrowed at base; calyx tubular, very glandular-pubescent; flowers yellow, in elongate panicles of cymes corolla lobes ovate-oblong 1. *glandulosa*.

Calyx divided nearly to the base:—

Leaves simple, crenate, the crenatures broad:—

Calyx-lobes narrow, lanceolate :—

Flowers yellow, in large corymbose bracteate panicles, the inflorescence glandular or glabrous; leaves obovate-spathulate especially the upper ones, up to 4 in. long, 1 in. broad; corolla-tube in fruit shining, white.....2. *floribunda*.

Flowers white :—

Calyx and corolla glandular-hairy; inflorescence in compact corymbs; leaves obovate, obtuse, up to 5 in. long, 2 in. broad, dotted with red spots (Cooke).....3. *olivacea*.

Calyx and corolla not glandular-hairy; inflorescence in spreading panicles of cymes; leaves elliptic, narrowed at base, more or less acute, up to 6 in. long, 3 in. broad, tinged with red (Cooke) 4. *Bhidei*.

Calyx-lobes large, ovate; leaves orbicular-obovate, cuneate at base, up to 3 in. long, 2 in. broad; flowers yellow, in compact corymbose cymes, the inflorescence glabrous; corolla-lobes obovate, mucronate 5. *grandiflora*.

Leaves pinnatifid, the segments, especially in upper leaves, usually narrow and even linear, sometimes broader; flowers pale yellow, in paniculate cymes with linear bracts; calyx-lobes lanceolate, glandular; corolla-lobes oblong-lanceolate, mucronate 6. *laciniata*.

1. *KALANCHOE GLANDULOSA*, Hochst.; F. B. I. ii. 414.

Deccan, in hilly country in Mysore (Wight) on dry rock soil.

A thick-stemmed succulent plant reaching 2 ft. in height.

2. *KALANCHOE FLORIBUNDA*, W. & A. 359; F. B. I. ii. 414.

Deccan, on dry hills in Coimbatore at 2,000–4,000 ft. (Fischer, etc.)

An erect succulent-leaved plant with glandular inflorescence.

Var. *glabra*, C. B. Clarke in F. B. I. ii. 415.

W. Gháts, on dry slopes from Mysore and N. Nilgiris to the Anamalais and hills of Travancore, at 2,000–4,000 ft.

An erect succulent, the inflorescence not glandular, and prominently corymbose.

3. *KALANCHOE OLIVACEA*, Dalz.; Cooke Bomb. Fl. i. 467.

W. Gháts, in the Anamalai Hills at Attakatti and Kadam-parai, 3,500–4,000 ft. among rocks (Fischer).

An erect succulent of an olive-brown colour when fresh.

4. *KALANCHOE BHIDEI*, T. Cooke Bomb. Fl. i. 467.

Deccan, in the hills of Coimbatore at Dimbam and Anai-

kerai at 3,500–5,000 ft. (Fischer); Pulney Hills (Bourne). An erect succulent reaching 3 ft. high, with large flower-panicles and broad leaves.

5. *KALANCHOE GRANDIFLORA*, W. & A. 359; F. B. I. ii. 415; Wt. Ill. t. 111.

W. Gháts, in the Nilgiri and Pulney Hills, above 6,000 ft.

A tall succulent plant with glaucous leaves and showy flowers.

6. *KALANCHOE LACINIATA*, DC.; F. B. I. ii. 415; W. & A. 360; Wt. Ic. t. 1158.

Deccan, on dry slopes in Coimbatore at 1,500 ft.; W. Gháts, N. slopes of Nilgiris and hills of Travancore at 3,000 ft.

A large succulent herb, up to 4 ft. high.

Bryophyllum pinnatum, Kurz, an introduced plant, is found in gardens and run wild in many places in plains Districts. It is remarkable for forming new plants at the crenatures of the leaves.

Family LIX. DROSERACEAE.

Perennial glandular-hairy herbs, insectivorous. *Leaves* radical or cauline, usually entire; stipules 2. *Flowers* hermaphrodite, regular. *Calyx* 4–5- or more-partite, the sepals free, imbricate, persistent. *Petals* as many as sepals, usually hypogynous, imbricate, marcescent. *Stamens* as many as petals; filaments free or connate at the base. *Ovary* free or adherent to the base of the calyx, globose or ovoid, 1–3-celled; styles 3–5; ovules numerous, usually on parietal placentas. *Fruit* a membranous, usually loculicidal 2–5-valved capsule. *Seeds* many, albumen fleshy, embryo minute.

Drosera, Linn.

Perennial herbs with glandular hairs, sometimes with bulbous roots. *Leaves* rosulate or cauline, the glandular hairs attracting and securing small insects which they can assimilate. *Flowers* white or pink, racemose cymose corymbose or solitary. *Calyx*-lobes 4, 5 or 8, erect, marcescent. *Petals* as many as sepals, also marcescent. *Stamens* as many as petals. *Ovary* free, ovoid or globose, 1-celled; ovules many, parietal; styles 2–5. *Capsule* loculicidally 2–5-valved. *Seeds* many, obovoid-ellipsoid, testa smooth, reticulate.

Rootstock not bulbous:—

Leaves all radical, rosulate, round-spathulate; scapes leafless; styles 5, undivided..... 1. *Burmanni*.

Leaves cauline, alternate, linear; styles 3, bifid to the base
2. *indica*.

Rootstock bulbous; leaves cauline, semilunate; styles 3, short, fimbriate 3. *peltata*.

1. *DROSERA BURMANNI*, Vahl; F. B. I. ii. 424; W. & A. 34; Wt. Ill. t. 20; Ic. t. 944.

All Districts, in suitable damp places and to the highest points in the hills.

An erect plant with leafless scapes about 4–6 in. high from the rosulate cushion of leaves at the base.

2. *DROSERA INDICA*, Linn.; F. B. I. ii. 424; W. & A. 34; Wt. Ill. t. 20.

N. Circars, especially in Ganjam; Deccan, in wet places in the Hills; W. Coast, S. Canara to Travancore, in swampy places.

A straggling leafy plant, the stems usually 3–4 in., sometimes up to 12 in. long.

3. *DROSERA PELTATA*, Sm.; F. B. I. ii. 424; W. & A. 34; Wt. Ill. t. 20.

W. Gháts, on open downs in the Nilgiri and Pulney Hills above 5,000 ft.

An erect, pretty plant with slender stems reaching 12 in. high and over, the leaves peltate with upturned cusps.

When being dried it stains the paper red.

Family LX. HALORRHAGIDACEAE.

Herbs, often aquatic. *Leaves* opposite or whorled, sometimes partly alternate, when submerged often pectinately pinnatifid; stipules 0. *Flowers* hermaphrodite or unisexual, small, axillary, solitary or fascicled, sessile or pedicelled. *Calyx*-tube adnate to the ovary, lobes usually 4. *Petals* 4, sometimes 2 or 0, valvate or slightly imbricate. *Stamens* 8, 4 or 1; anthers 2-celled, dehiscing longitudinally and laterally. *Ovary* 4-, 2- or 1-celled; ovules 4, pendulous; styles as many as cells; stigmas papillose or plumose. *Fruit* small, dry or drupaceous, 4-, 2- or 1-celled, indehiscent or separating into carpels. *Seeds* pendulous, 4 or rarely 1.

Terrestrial plants with monoecious flowers, ♂ flowers pedicelled; petals 4 in ♂ flowers; stamens 8; fruit 1-celled, 1-seeded

1. Serpicula.

Aquatic plants; petals 0:—

Flowers hermaphrodite or monoecious, axillary or in spikes; stamens 2-8; fruit 4-furrowed or separating into carpels; seeds 2 or 4

2. Myriophyllum.

Flowers unisexual, usually monoecious, axillary; stamen 1; fruit indehiscent, 4-celled; seeds 43. Callitriche.

1. Serpicula, Linn.

Small decumbent branching herbs. *Leaves* opposite or alternate, entire or toothed. *Flowers* monoecious, axillary, ♂ pedicelled, ♀ sessile. *Calyx*-tube adnate to the ovary; lobes 4. *Petals*: in ♂ flowers 4, cucullate; in ♀ flowers 0. *Stamens* 8, filaments filiform, anthers linear-oblong. *Ovary* 1-celled; ovules 4, pendulous; styles 4, short, stigmas plumose; in ♂ flowers pistillodes 4. *Fruit* a minute, indehiscent nut, 1-celled, 1-seeded, the enclosing calyx-tube ribbed or smooth.

Glabrous, little branching; leaves spathulate, entire or 3-toothed at apex; pedicels short, scarcely .4 in. long; petals acute at apex; fruit glabrous, ribbed and warted1. *brevipes*.
Hirsute with crisped hairs, much branched; leaves obovate, 3-5-toothed at apex; pedicels long, usually .6 to .8 in. long; petals obtuse at apex; fruit hairy, not ribbed.....2. *hirsuta*.

1. SERPICULA BREVIPES, W. & A. 338. *S. indica*, Thw.; F. B. I. ii. 431 *in part*.

W. Gháts, in Nilgiris and Pulneys, at 6,000-7,000 ft., in wet places.

2. SERPICULA HIRSUTA, W. & A. 338; Wt. Ic. t. 1,001. *S. indica*, Thw.; F. B. I. ii. 431 *in part*.

W. Gháts, in the Nilgiri Hills at 6,000-8,000 ft., on banks, common.

2. Myriophyllum, Linn.

Glabrous aquatic herbs with floating stems. *Leaves* opposite or whorled, the floating ones usually linear-serrate, the submerged ones pectinately pinnatifid. *Flowers* very small, hermaphrodite or monoecious, axillary or in nearly naked spikes; ♂ very shortly

pedicelled or sessile, ♀ sessile. *Calyx* in ♂ minute, 4- rarely 2-lobed, sometimes 0; in ♀ adnate to the ovary, 4-furrowed, lobes 0 or 4 minute. *Petals* in ♂ 2 or 4, concave, sessile; in ♀ usually 0. *Stamens* 2, 4 or 8. *Ovary* of 4, rarely 2, carpels; ovules solitary, pendulous; styles short, plumose. *Fruit* 4-furrowed separating into 4 or 2 cocci; embryo straight or curved.

Floral leaves short, up to .5 in. long, submerged leaves long and much pectinate; fruit carpels spreading stellately, tubercled; stamens 8

1. *indicum*.

Floral leaves long, up to 1 in. long or longer, submerged leaves short, often absent; fruit carpels erect, columnar, muricate; stamens 4

2. *intermedium*.

1. **MYRIOPHYLLUM INDICUM**, Willd.; F. B. I. ii. 433; W. & A. 339.

E. Coast, from Ganjam southwards, in ponds and canals; W. Coast, more scarce.

A floating aquatic, with very long stems and many submerged leaves.

2. **MYRIOPHYLLUM INTERMEDIUM**, DC.; F. B. I. ii. 433. *M. indicum*, Wt. Ill. t. 102 *except the fruit*. *Haloragis oligantha*, W. & A. 338; Wt. Ic. t. 1,061.

W. Gháts, especially Nilgiris, in wet places and ponds, above 5,000 ft.

Sometimes floating, with short submerged leaves, more often rooted in mud with only the upper leaves apparent.

3. **Callitriche**, Linn.

Small glabrous aquatic annual herbs. *Leaves* opposite, linear or obovate-spathulate, entire, the upper ones often rosulate. *Flowers* minute, axillary, usually monoecious, solitary or sometimes one ♂ and one ♀ together; bracteoles white, membranous, caducous. *Calyx* and *petals* 0. *Stamen* 1, forming ♂ flower. *Ovary* in ♀ flower 4-celled with 4 pendulous ovules; styles 2, long, subulate. *Fruit* indehiscent, of 4 carpels combined in 2 pairs, at length separating. *Seeds* pendulous; testa membranous; albumen fleshy; cotyledons short; radicle superior.

CALLITRICHE STAGNALIS, Scop.; F. B. I. ii. 434. *C. Wightiana*, Wall.; W. & A. 339; Wt. Ic. t. 1,947.

W. Gháts, Nilgiri and Pulney Hills, in wet places and ponds about 7,000–8,000 ft.

A small flaccid herb, rooting at the nodes, the carpels narrowly winged at the margins.

Family LXI. RHIZOPHORACEAE.

Trees or shrubs. *Leaves* opposite, entire or rarely toothed ; stipules interpetiolar, caducous. *Flowers* regular, usually hermaphrodite, axillary, solitary or in cymes racemes or panicles ; bracteoles usually in pairs at the base of the calyx. *Calyx*-tube more or less adnate to the ovary, rarely free ; lobes 4–14, valvate, persistent. *Petals* as many as the calyx-lobes and shorter than them, entire emarginate bifid or lacerate. *Stamens* usually twice as many as the petals, often in pairs opposite to them ; anthers 2-celled, rarely multi-locellate. *Ovary* 2–5-celled or 1-celled by suppression of the septa ; ovules usually 2 in each cell, pendulous ; style simple ; stigma simple or lobed. *Fruit* usually leathery, indehiscent, 1-celled, 1-seeded. *Seed* 1, pendulous, arillate or not, albumen fleshy or 0 ; embryo in albuminous seeds minute, in exalbuminous seeds elongate, often germinating while the fruit is on the tree.

Embryo exalbuminous, radicle large, protruded while the fruit is on the tree :—

Bracteoles present at the base of the calyx :—

Calyx-lobes and petals 4, entire ; stamens usually 8 ; ovary 2-celled.....1. **Rhizophora.**

Calyx-lobes and petals 5–6, the petals more or less laciniate :—

Stamens 10–12 ; ovary 3-celled.....2. **Ceriops.**

Stamens indefinite ; ovary 1-celled.....3. **Kandelia.**

Bracteoles absent ; calyx-lobes and petals 8–14 ; ovary 2–4-celled

4. **Bruguiera.**

Embryo albuminous ; radicle minute, not protruded :—

Calyx-tube with bracteoles, stamens many :—

Ovary semi-inferior, 3–5-celled, 2-ovuled in each cell ; leaves coriaceous5. **Carallia.**

Ovary superior, 3-celled, 2-ovuled in each cell ; leaves membranous6. **Weihea.**

Calyx-tube without bracteoles, adnate to the base of the 3-celled ovary ; leaves membranous, crenate ; stamens 8...7. **Blepharistemma.**

1. *Rhizophora*, Linn.

Trees; branches thick, marked by leaf-scars; aërial roots descending from the stem and branches. *Leaves* opposite, coriaceous, glabrous, mucronate, entire; stipules large. *Flowers* rather large, in axillary 2-3-chotomously divided, few-flowered cymes; bracteoles connate at the base of the calyx. *Calyx* 4-lobed; lobes coriaceous, valvate. *Petals* 4, entire, inserted on a fleshy disk. *Stamens* 8-12; filaments short; anthers linear. *Ovary* 2-celled, 2 ovules in each cell; style conical, subulate; stigma bifid. *Fruit* coriaceous, 1-celled, 1-seeded, ovoid, the persistent reflexed calyx-lobes surrounding its base. *Seed* pendulous, germinating on the tree, the radicle elongate, perforating the apex of the fruit.

Leaves elliptic, long-mucronate, up to 4 in. broad; cymes 3-7-flowered on peduncles 1-1.25 in. long; petals fleshy, lanate on the faces within

1. *mucronata*.

Leaves oblong-lanceolate, short-mucronate, up to about 2 in. broad; cymes 2-flowered, on stout peduncles about .2 in. long; petals thin, glabrous.....2. *Candelaria*.

1. RHIZOPHORA MUCRONATA, Lamk.; F. B. I. ii. 435; Wt. Ic. t. 238. *R. Candelaria*, W. & A. 310.

Tidal forests on both E. and W. Coasts. The Mangrove. A glabrous evergreen tree, often appearing buttressed by the mud being washed away from the branching aerial roots, the lower part of the stem dying off; usually also sending up conical excrescences from the roots, looking like inverted tent-pegs. Bark brown, with vertical clefts, a valuable tanning material; wood dark red, very hard, an excellent fuel. Vern. *Tel.* Upoo-poma; *Tam.* Kandal.

2. RHIZOPHORA CANDELARIA, DC. *R. conjugata*, Hensl.; F. B. I. ii. 436 *not of* Linn.

Tidal forests on both coasts; more scarce than the preceding; common in the Kistna Delta.

A glabrous small evergreen tree, similar to *R. mucronata*. Vern. *Tam.* Kandal.

2. *Ceriops*, Arn.

Shrubs or small trees with aërial roots from the stem and branches. *Leaves* opposite, ovate or obovate, entire, coriaceous.

Flowers small, in short rather dense axillary cymes; bracteoles connate under the calyx. *Calyx* 5-6-lobed, the tube adnate to the ovary. *Petals* 5-6, inserted at the base of a 10-12-lobed fleshy disk; emarginate, the apex more or less ciliate. *Stamens* 10-12, inserted between the lobes of the disk; filaments slender; anthers oblong. *Ovary* semi-inferior, 3-celled, 2 pendulous ovules in each cell; style short; stigma simple. *Fruit* coriaceous, 1-celled, 1-seeded, with persistent reflexed calyx-lobes. *Seed* as in *Rhizophora*, the radicle grooved and angular.

Petals tipped with 3-4 capitate bristles.....1. *Candolleana*.
 Petals tipped with many ciliae.....2. *Roxburghiana*.

1. *CERIOPS CANDOLLEANA*, Arn.; F. B. I. ii. 436; Wt. Ic. t. 240.

Tidal forests of the W. Coast; Quilon in Travancore (Wight).

A small evergreen tree with many buttresses at base and root excrescences as in *Rhizophora*. Leaves obovate, usually emarginate. Bark dark red, giving a good tanning material; wood orange-red, hard, an excellent fuel. Vern. *Mal.* An kandal.

2. *CERIOPS ROXBURGHIANA*, Arn.; F. B. I. ii. 436.

Tidal forests of the E. Coast, Godavari and Kistna Deltas and elsewhere.

A small evergreen tree similar to the preceding, the leaves obovate. Vern. *Hind.* Goran; *Tel.* Gatharu; *Tam.* Chiru kandal.

3. *Kandelia*, W. & A.

A small tree with aerial roots from the stem and branches. *Leaves* opposite, coriaceous, oblong, obtuse, entire. *Flowers* few, large, in axillary pedunculate dichotomously branched cymes, white; bracteoles connate round the base of the calyx. *Calyx* 5-6-lobed; tube short, adnate to the ovary; lobes linear, valvate. *Petals* 5-6, thin, bifid, the lobes multifid. *Stamens* many; filaments capillary; anthers small, oblong. *Ovary* semi-inferior, 1-celled; ovules 6, affixed in pairs to a central column; style slender; stigma 3-lobed. *Fruit* 1-celled, 1-seeded, girt with the persistent reflexed calyx-lobes. *Seed* as in *Rhizophora*.

KANDELIA RHEEDII, W. & A. 311; F. B. I. ii. 437; Wt. Ill. t. 89.

Tidal forests of the W. Coast; less common on E. Coast.

A small tree with pretty flowers, the pendulous radicle of the seed very slender, cylindric. Bark reddish-brown; wood soft, reddish-brown, used only for firewood. Vern. *Tel.* Thuvarkandan.

4. *Bruguiera*, Lam.

Trees or shrubs with aerial roots from the stem and branches. *Leaves* opposite, coriaceous, entire. *Flowers* solitary or cymose on axillary peduncles; bracteoles 0. *Calyx*-tube obconic or campanulate, coriaceous, adnate to the ovary; lobes 8-14, linear-lanceolate, valvate. *Petals* 8-14, oblong, 2-lobed or emarginate, involute, with a bristle in the sinus and others, usually 2-4, at the tip of each lobe. *Stamens* twice the number of the petals, in pairs within the petals; filaments filiform; anthers linear, mucronate. *Ovary* inferior, 2-4-celled, cells 2-ovuled; style filiform; stigma 2-4-lobed. *Fruit* 1-celled, 1-seeded, indehiscent, coriaceous, crowned with the calyx-lobes. *Seed* as in *Rhizophora*.

Flowers large, solitary, calyx-lobes erect in fruit; radicle grooved:—

Petals glabrous except at the base; leaves elliptic, acute, up to 6 in. long by 2.5 in. broad.....1. *conjugata*.

Petals densely hirsute on the margins; leaves elliptic-oblong, acute or acuminate, up to 5 in. long by 2 in. broad.....2. *eriopetala*.

Flowers small, in axillary cymes; calyx-lobes recurved in fruit; petals short, obtuse, slightly hairy; leaves elliptic-lanceolate, acute, up to 4 in. long, 1.5 in. broad; radicle almost terete.....3. *cylindrica*.

1. *BRUGUIERA CONJUGATA*, Merr. in Philipp. Journ. Sc. ix. 118. *B. gymnorhiza*, Lam.; F. B. I. ii. 437; W. & A. 311; *B. Rheedii*, Bl.; Wt. Ic. t. 293A.

Tidal forests of both coasts.

A rather large evergreen tree with short stout grooved rugose radicle; root excrescences frequent. *Wood* red, extremely hard, used for building and fuel. Vern. *Hind.* Kankra; *Tel.* Thuddu ponna.

2. *BRUGUIERA ERIOPETALA*, W. & A.; F. B. I. ii. 438; Wt. Ic. t. 239B.

Tidal forests of Travancore on W. Coast.

A small tree, similar to the preceding but scarce.

3. *BRUGUIERA CYLINDRICA*, W. & A. 311. *B. caryophylloides*, Bl.; F. B. I. ii. 438; Wt. Ill. t. 210. *B. malabarica*, Arn.; F. B. I. ii. 438.

Tidal forests of West Coast (Wight); E. Coast, Kistna delta (Weld, Boileau), S. Arcot.

A small tree with dark brown bark and red close-grained wood. Vern. *Tel.* Vurada.

5. *Carallia*, Roxb.

Trees or shrubs. *Leaves* opposite, petioled, ovate obovate or elliptic, entire or serrulate, glabrous, shining. *Flowers* small, in short 3-chotomous axillary branching cymes; bracteoles at base of calyx minute. *Calyx*-tube campanulate; lobes 5-8, valvate. *Petals* 5-8, inserted on a crenulate disk, clawed, entire or bifid, toothed or lacerate. *Stamens* twice the number of the petals and inserted with them on the disk; anthers small. *Ovary* semi-inferior, usually 3-5-celled, ovules 2 in each cell; style subulate; stigma 3-5-lobed. *Fruit* small, globose, usually 1-celled, 1-seeded, indehiscent. *Seed* subreniform; testa granular; albumen fleshy; embryo curved.

Leaves serrulate, ovate, acuminate, shining, 4-5 in. long, 2-2.5 in. broad, petals orbicular, the margins crenately waved; stigma 3-lobed 1. *lucida*.

Leaves entire, obovate, obtuse or shortly acute, the margins revolute, 3-5 in. long, 2 in. broad; petals orbicular-cordate, the margins deeply lacerate; stigma 4-lobed 2. *integerrima*.

1. *CARALLIA LUCIDA*, Roxb. Cor. Pl. t. 211; W. & A. 312; Wt. Ic. t. 605.

N. Circars, in the lower hills (*teste* Roxburgh).

A small evergreen tree. Vern. *Tel.* Karalli.

2. *CARALLIA INTEGERRIMA*, DC.; F. B. I. ii. 439 *in part*; Wt. Ill. t. 90; Bedd. Fl. t. 193.

Deccan, hills of Cuddapah, Kambakam Hill in Chingleput (Bourne); W. Coast and W. Gháts, in evergreen forests, up to 4,000 ft.

A pretty evergreen tree, sometimes with aërial roots, the flower buds frequently covered with yellow resin. Bark dark grey, thin; wood red, hard, with a pretty silver grain, useful for carpentry. Vern. *Hind.* Kierpa; *Tel.* Karalli; *Kan.* Andipunar; *Mal.* Varanga.

6. Weihea, Spreng.

Trees or shrubs. *Leaves* opposite, petioled, entire or obtusely serrate. *Flowers* axillary, solitary or fascicled; bracteoles 2, connate in a cup, at length a short distance below the calyx. *Calyx*-tube shortly turbinate, adnate to the ovary; lobes 4-5, spreading, valvate. *Petals* 4-5, inserted under the margin of an obscure disk, clawed, spathulate, fimbriate. *Stamens* 16-30, inserted on the disk; filaments filiform; anthers oblong. *Ovary* superior, 3-celled, 2 pendulous ovules in each cell; style filiform; stigma 2-4-lobed. *Fruit* globose, fleshy, splitting in 3-4 valves, 3-4-celled, the cells 1-2-seeded. *Seeds* ovoid, arillate, albuminous; cotyledons flat; radicle terete.

WEIHEA ZEYLANICA, Baill.; F. B. I. ii. 441; Bedd. Fl. t. 194.

W. Gháts, in the hills of Travancore and Tinnevely, at low elevations.

A small tree with thin ovate acuminate leaves and white flowers. Vern. *Tam.* Kanun.

7. Blepharistemma, Wall.

A tree. *Leaves* opposite, petioled, membranous, elliptic-oblong, acuminate, crenate. *Flowers* polygamo-dioecious, in many-flowered axillary cymes; bracteoles 0. *Calyx*-tube campanulate, adnate to the base of the ovary; lobes 4, erect. *Petals* 4, clawed, spathulate, lacerate at apex, inserted round an 8-lobed disk, the disk lobes long in ♂, shorter in ♀. *Stamens* 8, inserted on the margin of the disk, small in ♀; filaments ciliate; anthers oblong. *Ovary* free, 3-celled, 2 ovules in each cell; style short in ♂, longer in ♀; stigma shortly 3 lobed. *Fruit* a fleshy capsule.

BLEPHARISTEMMA CORYMBOSUM, Wall.; F. B. I. ii. 441.

W. Coast and W. Gháts, from Coorg to Travancore, up to 2,500 ft., in evergreen forest.

A handsome straight-stemmed tree, in favourable situations reaching a considerable size, with white flowers and greenish-black fruit. Wood pale greenish-yellow, moderately hard. Vern. *Mal.* Nir kurunda.

Family LXII. COMBRETACEAE.

Trees or shrubs, often climbing. *Leaves* alternate subopposite or opposite, sometimes ternate, entire; stipules 0. *Flowers* hermaphrodite, rarely unisexual or polygamous, in spikes or racemes often paniced; bracteolate. *Calyx*-tube adnate to the ovary and produced above it, the limb 4-5-lobed, the lobes valvate. *Petals* 4-5 or 0, inserted on the calyx, alternate with its lobes. *Stamens* as many as, or twice as many as the calyx-lobes, in 2 series; filaments filiform or subulate; anthers usually didymous. *Ovary* inferior, 1-celled, usually crowned with a lobed disk; ovules usually 2-3, sometimes more; style subulate; stigma simple. *Fruit* coriaceous or drupaceous, generally indehiscent, angular or winged, sometimes crowned by the persistent calyx. *Seed* 1; albumen 0; cotyledons convolute plicate or plano-convex.

Petals 0:—

Calyx-limb deciduous; erect trees or shrubs:—

Flowers in spikes or racemes1. **Terminalia.**

Flowers in capitate heads2. **Anogeissus.**

Calyx-limb accrescent in fruit; straggling shrubs...3. **Calycopteris.**

Petals 4-5:—

Calyx-limb persistent; leaves alternate; trees or shrubs

4. **Lumnitzera.**

Calyx-limb deciduous; leaves opposite; climbers:—

Calyx-tube not or only shortly produced beyond the ovary

5. **Combretum.**

Calyx-tube produced more than 5 in. beyond the ovary

6. **Quisqualis.**

1. **Terminalia, Linn.**

Trees. *Leaves* alternate or subopposite, entire or slightly crenulate, often with glands on the petiole or on the lower part of the midrib beneath; stipules 0. *Flowers* small, green or white, in spikes, the spikes solitary or in panicles; hermaphrodite or sometimes the upper flowers of the spike ♂, the lower ♂; bracteoles small, usually soon deciduous. *Calyx*-tube ovoid or cylindric, constricted above the ovary; limb campanulate with 5 triangular valvate lobes. *Petals* 0. *Stamens* 10 in 2 series, the 5 upper alternate with the calyx lobes, the 5 lower opposite them; filaments subulate, exserted; anthers small. *Disk* inside the

stamens, 5-lobed, villous. *Ovary* inferior, 1-celled; ovules 2-3, pendulous; style subulate; stigma small. *Fruit* ovoid, smooth or angular or winged with 2-5 equal or unequal wings, indehiscent. *Seed* solitary, exalbuminous; cotyledons convolute.

Fruit not winged, ovoid or subcompressed:—

Flowers in simple spikes; leaves clustered at the ends of the branchlets, alternate, obtuse:—

Leaves green, thin, obovate, base cordate, petiole very short; fruit ellipsoid, more or less compressed, 2-ridged when dry, glabrous 1. *Catappa*.

Leaves greyish-green, thick, broadly elliptic, cuneate at base, petiole very long; fruit subglobose, very faintly 5-ridged when dry, minutely brown-tomentose 2. *bellerica*.

Leaves glaucous, thick, ovate, rounded or attenuate at base, obtuse or emarginate at apex, petiole short; fruit obovoid, very faintly 5-ridged when dry, glabrous 3. *pallida*.

Flowers in simple spikes or short terminal panicles; leaves not clustered at the ends of the branchlets, opposite or subopposite:—

Fruit minutely brown-tomentose, ovoid or ellipsoid, faintly 5-ridged when dry; leaves coriaceous, ovate or ovate-oblong, tawny-pubescent, up to 5 in. long by 3 in. broad, nerves irregular; spikes densely tawny-pubescent, as are the branchlets.... 4. *Gella*.

Fruit glabrous, shining:—

Leaves ovate elliptic or obovate, obtuse and usually apiculate at apex, usually rounded at base, under surface glabrous to tawny-villous, up to 7 in. long by 3-3.5 in. broad, nerves regular, parallel; spikes nearly glabrous; fruit obovoid, faintly angled, up to 1.5 in. long, 1 in. in diam..... 5. *Chebula*.

Leaves ovate-lanceolate, acuminate at apex, unequally attenuate or rounded at base, pubescent when young, glabrous when old, up to 4 in. long, 1-2 in. broad, nerves fairly regular; spikes slender, rusty-puberulous; fruit ovoid, covered with round spots, .75-1.25 in. long, .5 in. in diam.... 6. *travancorensis*.

Fruit with 5 equal angles or wings; flowers in panicles of spikes with linear bracteoles; leaves often more or less crenate or serrate:—

Fruit with short hard angles or wings, usually notched near the top, the lines on the wings oblique and curving upwards; leaves oblong or elliptic, usually crenulate; bark smooth..... 7. *Arjuna*.

Fruit with long thin papery wings, usually rounded at top, the lines on the wings straight and horizontal.

Fruit softly and minutely yellowish brown-velvety as are the

leaves beneath twigs and inflorescence ; leaves coriaceous, elliptic-ovate or -oblong, obtuse and often emarginate at apex, unequally cordate at base with usually 1 or 2 sessile glands at the base of the midrib beneath, up to 9 in. long by 4·5 in. broad ; fruit, including wings, 1·5 in. in diam.....8. *coriacea*.

Fruit glabrous, large, usually 2 in. in diam., including wings :—

Calyx villous with yellowish-brown hairs as are the underside of the leaves, the twigs and inflorescence ; leaves coriaceous, elliptic-oblong, obtuse or even emarginate or slightly acute at apex, rounded or cordate at base, nerves many, prominently parallel, glands near the base of the midrib large and stalked, up to 7 in. long, 3 in. broad ; panicles dense.....9. *tomentosa*.

Calyx glabrous without, the leaves, twigs and inflorescence all nearly or quite glabrous ; leaves membranous or chartaceous, elliptic- or obovate-oblong, obtuse or acute at apex, narrowed at base, the nerves parallel but not prominent, glands some way up the midrib beneath, stalked, up to 7 in. long, 2·5 in. broad ; panicles lax10. *crenulata*.

Fruit with 3 unequal wings, 1 long and 2 short ; leaves elliptic or elliptic-oblong, acute or acuminate at apex, rounded or cordate at base, lower subopposite, upper alternate, at first rusty-puberulous, afterwards glabrescent, up to 7 in. long, 2–2·5 in. broad ; panicles with many slender spikes, the flowers small with recurved bracteoles ; fruit rusty-puberulous, the middle wing ·5 in. long.....11. *paniculata*.

1. **TERMINALIA CATAPPA**, Linn. ; F. B. I. ii. 444 ; W. & A. 313 ; Wt. Ic. t. 172 ; Bedd. Fl. t. 18.

Cultivated in gardens and avenues near the coast, introduced from Malaya. The Indian Almond.

A large deciduous handsome tree with large leaves, which turn red before falling, the trunk often buttressed. Wood red, hard. The nut-kernels with thin spirally folded cotyledons are eaten. Vern. *Hind.* Deshi-badam ; *Tel.* Vedam ; *Tam.* Nat vadam ; *Mal.* Adamarram.

2. **TERMINALIA BELLERICA**, Roxb. Cor. Pl. t. 198 ; F. B. I. ii. 445 ; W. & A. 313 *excl. syn.* ; Wt. Ic. t. 91 ; Bedd. Fl. t. 19.

Deciduous forests in all Districts, up to about 3,000 ft.

A large deciduous tree with long-petioled leaves, pubescent flowers and tomentose fruit. Bark bluish-grey with vertical cracks ; wood yellowish-grey, hard, not durable and little used, but useful if carefully seasoned. The fruit

is the Belleric myrabolam used in tanning, but of less value than that of *T. Chebula*. Vern. *Hind.* Bahera; *Ur.* Thara; *Tel.*, *Tam.* Tani; *Mal.* Thani.

3. *TERMINALIA PALLIDA*, Brand. Ind. Trees, 308.

Deccan, in dry deciduous forest, in Cuddapah, Kurnool, N. Arcot and Chingleput, chiefly on rocky hills, up to 2,000 ft.

A small subevergreen tree with glaucous leaves, glabrous flowers and fruit similar in character and uses to that of *T. Chebula*. Vern. *Tel.* Tella karaka.

4. *TERMINALIA GELLA*, Dalz. in Hook. Journ. Bot. iii. 27; Bedd. Fl. ciii.

Deccan, Ramandrúg Hills of Bellary, Nandidrúg in Mysore; W. Gháts, in the lower E. Nilgiris, Pulneys and Ayamalai Hills, up to 3,000 ft.

A tree, probably of large size, with large velvety fruit, dense spikes and coriaceous leaves, the petioles .5-1 in. long, with two glands at apex below the blade.

5. *TERMINALIA CHEBULA*, Retz; Roxb. Cor. Pl. t. 197; F. B. I. ii. 446 *in part*; Brand. For. Fl. t. 29.

N. Circars and Deccan, in deciduous forests; W. Coast and W. Gháts, on dry slopes up to 3,000 ft. The Myrabolam tree.

A large tree in good soil, a small one in dry rocky places and at high elevations, the leaves usually tawny-pubescent with short petioles up to .5 in. long, bearing 2 glands below the blades, the fruit very variable in size and shape. These fruits, Chebulic myrabolams, give a valuable tanning material and a yellow dye. Bark dark brown; wood brownish-grey, very hard, used in building and for agricultural work. Vern. *Hind.* Harra; *Ur.* Karedha; *Tel.* Karaka; *Tam.* Kadakai.

Var. *tomentella*, C. B. Clarke in F. B. I. ii. 446. Under surface of leaves villous beneath with reddish hairs.

N. Circars, in the hills of Ganjam and Godavari.

6. *TERMINALIA TRAVANCORENSIS*, W. & A. 314. *T. angustifolia*, Roxb.; F. B. I. ii. 449; Bourd. in Journ. Bomb. Nat. Hist. Soc. xii. 351, t. 4.

W. Gháts, evergreen forests of Travancore, up to 2,000 ft. (Bourdillon).

A lofty tree with glabrous lanceolate leaves, the petiole 75 in. long, without glands. Bark pale brown, smooth; wood pale brown, hard. Vern. *Tam.* Pei kadakai, Morgatchie; *Mal.* Kotta kadakai.

7. *TERMINALIA ARJUNA*, W. & A. 314 (in note); F. B. I. ii. 447; Bedd. Fl. t. 28. *T. Berryi*, W. & A. 314.

N. Circars and Deccan, more scarce in Carnatic except in Tinnevely and on the W. Coast, on the banks of rivers and streams, often planted.

A large and handsome deciduous tree usually with narrow oblong leaves, the stems often buttressed. Bark pinkish-grey, smooth; wood brown, variegated with darker streaks, very hard and useful. Vern. *Hind.* Arjuna; *Ur.* Arjuno; *Tel.* Yermaddi; *Tam.* Vella marda, Kula maruthu.

8. *TERMINALIA CORIACEA*, W. & A. 315. *T. tomentosa* var. *coriacea*, C. B. Clarke in F. B. I. ii. 448.

Deccan, on dry hills in deciduous forest, chiefly in the Ceded Districts and up to 4,500 ft. as at Horsleykonda.

A large tree in suitable localities, otherwise often stunted. noticeable for the abundant yellowish velvety down. Bark deeply cracked; wood hard, dark brown. Vern. *Tel.* Tani.

9. *TERMINALIA TOMENTOSA*, W. & A. 314. *T. tomentosa* var. *typica*, C. B. Clarke in F. B. I. ii. 447; Wt. Ic. t. 195 probably.

N. Circars, deciduous forests of Ganjam and Godavari; Deccan, in Hyderabad and Bellary.

A large tree with the under-surface of the leaves villous, also the inflorescence; the fruit large, glabrous. Bark rough, much fissured; wood as in the preceding. Vern. *Hind.* Asan, Saj; *Ur.* Sahaju; *Tel.* Tani.

10. *TERMINALIA CRENULATA*, Roth; W. & A. 314. *T. tomentosa*, var. *crenu'ata*, C. B. Clarke in F. B. I. ii. 448.

W. Coast and W. Ghâts, from S. Canara southwards, up to 2,000 ft.

A large tree with nearly glabrous rather thin leaves and glabrous fruit. Bark greyish-black; wood dark brown, streaked with black, hard and useful for building and agricultural purposes. Vern. *Tam.* Karu maruthu; *Mal.* Thembava.

11. *TERMINALIA PANICULATA*, Roth; F. B. I. ii. 448; W. & A. 315; Bedd. Fl. t. 20.

S. Deccan, in the deciduous forests of Cuddapah and Bellary; W. Gháts, in deciduous forests from S. Canara to Travancore, common up to 2,000 ft.

A large deciduous tree with characteristic fruit. Bark dark brown, cracked; wood pale brown, smooth, very hard, a useful building wood. Vern. *Tel.* Neemeeri; *Tam.* Pe-karakai, Vem-marúthu; *Mal.* Pillai marúthu.

2. *Anogeissus*, Wall.

Trees or shrubs. *Leaves* alternate or subopposite, petioled, entire. *Flowers* in dense globose heads on short axillary peduncles or in short cymes; bracts on the peduncles or at the cyme branches often leafy; bracteoles minute. *Calyx*-tube slender above the ovary; limb cup-shaped with 5 lobes. *Petals* 0. *Stamens* 10, in 2 series; anthers small. *Ovary* inferior, 1-celled; ovules 2, pendulous; style subulate. *Fruits* packed in dense heads, compressed, 2-winged, ending in the persistent calyx-tube and sometimes limb. *Seed* 1; cotyledons convolute.

Leaves elliptic or suborbicular, up to 3 in. long, 2-2.5 in. broad, obtuse at apex, rounded or sometimes cordate at base; flower-heads usually in cymes; calyx-tube rather short, about .1 in. long, lobes reflexed; fruit broadly winged, the wings rounded, entire.....1. *latifolia*.

Leaves elliptic-lanceolate, up to 2.5 in. long, 1 in. broad, acute at apex, narrowed at base; flower-heads usually solitary on bracteate peduncles; calyx-tube long and slender, about .25 in., lobes spreading; fruit fairly broadly winged with dentate wings2. *acuminata*.

1. *ANOGEISSUS LATIFOLIA*, Wall.; F. B. I. ii. 450; Bedd. Fl. t. 15. *Conocarpus latifolia*, DC.; W. & A. 316; Wt. Ic. t. 994.

N. Circars, Deccan and Carnatic to S. Travancore, in dry deciduous forests and up to 4,000 ft.

A large deciduous tree, conspicuous by its smooth grey bark and by the leaves turning red before falling. Wood grey, hard, with a small purplish heartwood, strong and tough and useful for agricultural implements, carts, building and fuel. It gives a gum and the leaves are used in tanning. Vern. *Hind.* Bakli; *Ur.* Dohu; *Tel.* Chiriman; *Tam.* Vellay naga; *Mal.* Maru kanchiram.

var. *villosa*, C. B. Clarke. Leaves densely rusty-villous.

S. Deccan, in Mysore and N. Nilgiris.

2. *ANOGEISSUS ACUMINATA*, Wall.; F. B. I. ii. 450; Bedd. Fl. t. 16. *Conocarpus acuminata*, Roxb.; W. & A. 316.

N. Circars, from Ganjam to Godavari, usually on river banks, often cultivated.

A large deciduous tree with rough dark grey bark and drooping branches. Wood grey, shining, hard, not so good in quality as that of *A. latifolia*. Vern. *Ur. Pasi*; *Tel. Panchman*, *Pansi*; *Tam. Nunnera*.

3. *Calycopteris*, Lamk.

A diffuse scandent shrub. *Leaves* opposite, entire, elliptic or ovate. *Flowers* in dense axillary racemes, crowded in large panicles towards the ends of the branches. *Calyx*-tube elongate, 5-striate, produced above the ovary; limb 5-lobed, the lobes persistent, recurved or spreading, accrescent. *Petals* 0. *Stamens* 10 in 2 series, short, 5 opposite to 5 alternate with the calyx-lobes; filaments subulate; anthers didymous. *Ovary* inferior, 1-celled; ovules 3, pendulous; style subulate; stigma simple. *Fruit* narrow, ovoid, 5-ribbed, 1-seeded, surmounted by the enlarged calyx. *Seed* solitary; cotyledons convolute.

CALYOPTERIS FLORIBUNDA, Lamk.; F. B. I. ii. 449. *Getonia floribunda*, Roxb. Cor. Pl. t. 87; W. & A. 315.

N. Circars and Deccan, in deciduous forests or along water-courses up to 2,500 ft.

A straggling shrub, often climbing, the wood of peculiar structure. Vern. *Ur. Kokundia*; *Tel. Bandi murududu*.

4. *Lumnitzera*, Willd.

Littoral glabrous shrubs or small trees. *Leaves* alternate, coriaceous, obovate-cuneate, entire or crenate, clustered towards the ends of the branches. *Flowers* small, in axillary or terminal racemes; bracteoles 2, on the calyx-tube. *Calyx*-tube oblong, produced above the ovary; lobes 5, persistent. *Petals* 5, oblong, spreading. *Stamens* 10, in 2 series, sometimes fewer, those of one series often wholly or partially absent. *Ovary* 1-celled, inferior; ovules 2-5, pendulous; style subulate; stigma simple. *Fruit* woody, elliptic-oblong, crowned by the persistent calyx-lobes. *Seed* solitary; cotyledons convolute.

LUMNITZERA RACEMOSA, Willd.; F. B. I. ii. 452; W. & A. 316. E. and W. Coasts, in mangrove swamps.

An evergreen tree of shrubby growth with rather small leaves and white flowers. Bark thick, brown, rough; wood hard, greyish-brown with a darker heartwood, used for posts and as fuel. Vern. *Tel.* Kadivi, Thandara; *Tam.* Tipparathai.

5. *Combretum*, Linn.

Shrubs, usually straggling or climbing. *Leaves* entire, opposite, petiolate, sometimes alternate or ternate. *Flowers* polygamodioecious, spicate, the spikes often paniced; bracteoles small. *Calyx*-tube constricted above the ovary; limb campanulate or funnel-shaped; lobes 4-5. *Petals* as many as the calyx-lobes and inserted between them, sometimes 0. *Stamens* twice as many as the calyx-lobes, in 2 series; filaments slender; anthers small, didymous. *Ovary* inferior, 1-celled; ovules 2-5, pendulous; style subulate; stigma simple. *Fruit* dry, usually indehiscent, with 5 ridges or wings, the wings chartaceous. *Seed* usually solitary; testa membranous, protruded into the angles of the wings; cotyledons plicate, rarely convolute; radicle superior.

Flowers small, with campanulate calyx-limb and 5 calyx-lobes and petals, bracteoles linear, as long as flowers; leaves oblong, abruptly acuminate, up to 6 in. long, 2 in. broad, the transverse nervules many, horizontal, floral leaves cream-white; fruit with 5 papery wings, oblong, 1 in. long.....1. *decandrum*. Flowers with 4 calyx-lobes and petals, bracteoles minute; leaves all green, transverse nervules of leaves irregular, branching:—

Calyx-tube above the ovary widely campanulate; leaves ovate to lanceolate, often nearly orbicular, pale and thin when dry, variable in size; fruit with 4 papery wings, nearly globose in outline, .75 in. in diam.....2. *ovalifolium*.

Calyx-tube above the ovary funnel-shaped; leaves ovate to nearly orbicular with a short abrupt acumination, up to 5 in. long, 4 in. broad, coriaceous, greenish and shining when dry; fruit with 4 papery striate wings, globose in outline, 1.5 in. in diam.

3. *extensum*.

1. **COMBRETUM DECANDRUM**, Roxb. Cor. Pl. t. 59; F. B. I. ii. 452. *Poivreia Roxburghii*, DC.; W. & A. 317.

N. Circars, from Ganjam to Godavari, abundant in open forest land.

A large climbing shrub with white honey-scented flowers and cream-coloured conspicuous floral leaves, a troublesome forest climber, difficult to destroy. Vern. *Ur. Atundi*; *Tel. Arikota*.

2. *COMBRETUM OVALIFOLIUM*, Roxb.; F. B. I. ii. 458; W. & A. 317.

N. Circars, Deccan and Carnatic, in deciduous forest, up to 2,000 ft.; W. Coast, in S. Canara.

A large climbing shrub with large panicles of small flowers and rather small fruit. The branches are used for cattle-ropes. Vern. *Tam. Verragay*.

3. *COMBRETUM EXTENSUM*, Roxb.; F. B. I. ii. 458. *C. Wightianum*, Wall.; W. & A. 317; Wt. Ic. t. 227.

W. Coast, in S. Canara (Wight).

A large climbing shrub with large leaves and fruit and flowers in panicles of rather dense spikes.

6. *Quisqualis*, Linn.

Large straggling or climbing shrubs. *Leaves* opposite, oblong or obovate, entire. *Flowers* in short axillary or terminal spikes, white or red; bracteoles small. *Calyx*-tube produced above the ovary; limb 5-lobed. *Petals* 5. *Stamens* 10, short. *Ovary* 1-celled; ovules 3-4, pendulous; style filiform, somewhat adnate to the calyx-tube; stigma subcapitate. *Fruit* dry, coriaceous, 5-angled or 5-winged. *Seed* 1; cotyledons not convolute.

QUISQUALIS MALABARICA, Bedd. Ic. t. 155; F. B. I. ii. 460.

W. Gháts, Carcoor Ghát in Wynaad (Beddome) at 1,500 ft.; Travancore forests at 300 ft. (Bourdillon).

A large climbing shrub with calyx-tube about 5 in. long, pink petals, elliptic-ovate or -lanceolate acuminate leaves reaching 5 in. in length, the petioles hardening as rigid spines, and a *Combretum*-like 5-winged fruit about 1 in. long.

Quisqualis indica, Linn., is a large straggling or climbing shrub from the Malay Archipelago, with showy long-tubed flowers changing colour from white to orange and red, commonly cultivated in gardens in the plains.

Family LXIII. MYRTACEAE.

Trees or shrubs, rarely herbs. *Leaves* entire, opposite or alternate, usually with an intramarginal nerve, and dotted with pellucid glands; stipules none or minute, deciduous. *Flowers* regular, hermaphrodite or rarely polygamous, axillary or terminal, solitary or in cymes or corymbs; bracteoles usually 2, sometimes 0. *Calyx*-tube adnate to the ovary and sometimes produced above it, sometimes with a disk at the mouth; limb of 4 or 5 persistent or deciduous lobes, often closed in bud. *Petals* as many as the lobes of the calyx and alternate with them, inserted on the margin of the disk or the mouth of the calyx-tube, imbricate, sometimes connate and falling as a calyptra. *Stamens* many, inserted within the petals in one or more rows, often bent inwards in bud; anthers 2-celled, dehiscing longitudinally. *Ovary* inferior or semi-inferior, 1- or more- but usually 2-celled, with many ovules, the ovules usually axile, sometimes pendulous; style simple; stigma small. *Fruit* crowned with the calyx-limb, a berry or capsule with many seeds, sometimes only 1, by arrest. *Seeds* exalbuminous.

Leaves opposite or very rarely alternate:—

Leaves with 3-5 ribs, very tomentose; ovary 3-6-celled, many-seeded.....1. **Rhodomyrtus.**

Leaves penninerved:—

Calyx-limb closed in bud, the lobes in flower valvate; ovary many-celled2. **Psidium.**

Calyx-limb 4-5-lobed, the lobes free; ovary usually 2-celled:—

Calyx-tube produced beyond the ovary; flowers in cymes, the stamens bent back inwards in bud at the middle:—

Calyx-tube with a thickened staminal disk at the mouth; flowers usually large, the petals falling free.....3. **Jambosa.**

Calyx-tube without a thickened staminal disk; flowers usually small, the petals falling off either free or more often as a calyptra4. **Syzygium.**

Calyx-tube not produced beyond the ovary; flowers solitary or fascicled or in short racemes, the stamens not bent inwards at the middle in bud, but only erect or incurved:—

Ovary with 2 cells and many axile ovules; flowers axillary or subterminal.....5. **Eugenia.**

Ovary with 2 cells, each with 4 pendulous ovules; flowers supra-axillary.....6. **Meteoromyrtus.**

Leaves alternate in older plants, young leaves often different from the later and usually opposite; petals falling off as a calyptra

7. **Eucalyptus.**

1. **Rhodomyrtus**, DC.

Trees or shrubs. *Leaves* opposite, 3- or 5-ribbed. *Flowers* rather large, in axillary 1-7-flowered cymes; bracteoles small, deciduous. *Calyx*-tube turbinate, not or hardly produced beyond the ovary; lobes 5, persistent. *Petals* 5, spreading. *Stamens* indefinite, free, in many series. *Ovary* 1- 2- 3-celled, but appearing 2- 4- 6-celled by spurious partitions between the pairs of ovules which are arranged in vertical rows; style filiform; stigma capitate. *Fruit* a globose berry with numerous horizontal seeds. *Seed* compressed, exalbuminous, reniform or orbicular, horizontal; testa hard; embryo curved with small cotyledons and long radicle.

RHODOMYRTUS TOMENTOSA, Wt. Spic. Neilgh. t. 71; F. B. I. ii. 469. *Myrtus tomentosa*, Ait.; W. & A. 328; Wt. Ill. t. 97*3, Ic. t. 522.

Nilgiri and Pulney Hills, and southwards above 5,000 ft., on open downs, on dry slopes. Hill Gooseberry.

A thickly tomentose shrub with grey-tomentose foliage, pink flowers and pleasant fruit, much eaten on the Nilgiris. Fyson says that the Pulney fruit is not so good. Bark thin, red, papery; wood dark red, close-grained, makes good walking-sticks. Vern. *Badaga* Thaontay; *Trav. Hills*, Koratta.

2. **Psidium**, Linn.

Trees or shrubs. *Leaves* opposite, entire, not dotted. *Flowers* large, white, on 1- or few-flowered axillary peduncles. *Calyx* urceolate or obovate, limb undivided in aestivation, separating valvately into 4-5 lobes when in flower. *Petals* 4 or 5, free. *Stamens* many, inserted in several series on a wide disk. *Ovary* many-celled, with numerous ovules in each cell; style subulate; stigma peltate or capitate. *Fruit* a globose ovoid or pyriform berry, usually crowned by the calyx-limb. *Seeds* many, sub-reniform; testa hard; embryo curved with short cotyledons and long radicle.

PSIDIUM GUAJAVA, Linn.; F. B. I. ii. 468.

An American plant, cultivated and run wild in most Districts. The Guava.

A small tree, much cultivated for its fruit. Bark smooth, thin, greenish-grey; wood greyish-brown. Vern. *Hind*. Amrud; *Tel.* Jama; *Tam.* Segapu; *Kau.* Sebe; *Mal.* Pela.

3. *Jambosa*, DC.

Trees. *Leaves* opposite, entire, pellucid-dotted, petioles short. *Flowers* large, 4-merous, jointed with the top of the pedicel, in terminal or rarely lateral cymes, the branches 3-chotomously divaricate; bracteoles 0. *Calyx*-tube more or less turbinate, usually attenuate at the base, the mouth produced beyond the ovary and furnished with a thickened staminal disk; lobes rounded, persistent. *Petals* 4, inserted on the top of the mouth of the calyx, broad, concave, obtuse, falling singly. *Stamens* very numerous, free, longer than the petals, bent inwards in the middle regularly when in bud, later unfolding. *Ovary* 2-celled, many-ovuled; style slender; stigma slightly acute. *Fruit* a 1-2-seeded fleshy berry, crowned by the calyx-limb and thickened disk. *Seeds* large, angled; cotyledons thick, fleshy; radicle small, concealed between the cotyledons.

Flowers pedicelled:—

Leaves rounded or cordate at base:—

Flowers in terminal corymbose cymes:—

Leaf-nerves and intramarginal nerve conspicuous, regular; leaves cordate at base:—

Leaves lanceolate, long-acuminate, 6-9 in. long, 1·5-2·5 in. broad; calyx-tube slender, ·5-·75 in. long; fruit 1·5 in. in diam.....1. *Munronii*.

Leaves elliptic-oblong, acute or obtuse, 6-9 in. long, 3-3·5 in. broad; calyx-tube stout, ·4 in. long; fruit 1 in. in diam.

2. *Mundagam*.

Leaf-nerves and intramarginal nerve not conspicuous, the latter irregular and often double; leaves elliptic, obtusely acute, rounded at base, 3-4·5 in. long, 1·5-2·5 in. broad; calyx-tube thick, subcylindric, ·5 in. long3. *courtallensis*.

Flowers in lateral cymes on the old wood; leaves elliptic-ovate or -lanceolate, long acuminate, the nerves and intramarginal

nerve very conspicuous, 4-7 in. long, 2-4 in. broad; calyx-tube short, thick; fruit 1·5 in. in diam., spherical.....4. *Rama-Varma*.

Leaves narrowed at base; flowers in terminal corymbose cymes:—

Leaves elliptic or ovate:—

Leaf-nerves and intramarginal nerve somewhat obscure:—

Leaves ovate or elliptic, bluntly acuminate, 2·5 in. long, 1-2 in. broad; calyx-tube slenderly funnel-shaped below, suddenly broadening above, about ·75 in. long; fruit ovoid, 1 in. in diam.....5. *laeta*.

Leaves elliptic, acute to caudate-acuminate, 3-7 in. long, 1-3 in. broad; calyx-tube shortly and stoutly obconic, about ·4 in. long; fruit hemispherical, 1 in. in diam.

6. *hemispherica*.

Leaf-nerves and intramarginal nerve prominent; leaves narrowly elliptic-oblongate, acuminate at both ends, the apex blunt, 3-4·5 in. long, 1-1·5 in. broad; calyx-tube campanulate, later hemispheric, ·2 in. long; fruit apparently small

7. *Bourdillonii*.

Leaves linear or lanceolate, acuminate at both ends:—

Leaves 1·5-2 in. broad, the nerves and intramarginal nerve fairly prominent; calyx-tube funnel-shaped, ·5 in. long; fruit globose, 1-2 in. in diam.8. *vulgaris*.

Leaves ·5-·75 in. broad, the nerves and intramarginal nerve faint; calyx-tube very slender at base, broadly turbinate above, ·7 in. long; fruit globose, ·75 in. in diam... 9. *occidentalis*.

Flowers sessile; leaves broadly ovate, very coriaceous, obtuse at apex, shining, nerves and intramarginal nerve prominent but irregular, 4-5 in. long, 3 in. broad; calyx-tube narrowed below....10. *Beddomei*.

1. JAMBOSA MUNRONII, Walp. *Eugenia Munronii*, Wt.; F. B. I. ii. 472; Wt. Ic. t. 546.

W. Gháts, from S. Canara southwards, up to 5,000 ft., in evergreen forests.

A handsome tree with large reddish or white flowers and purplish-green fruit. Vern. *Tam. Ilambili*.

2. JAMBOSA MUNDAGAM, Gamble n. comb. *Eugenia Mundagam*, Bourd. For. Trees Trav. 182.

W. Gháts, in the evergreen forests of Travancore, up to 4,000 ft.

A medium-sized tree with white fragrant flowers. Bark smooth, brown; wood brown, rough, used for posts. Vern. *Tam. Katta samba*; *Mal. Mundagam*.

3. *JAMBOSA COURTALLENSIS*, Gamble in Kew Bull., 1918, 239.
W. Gháts, hills of Tinnevely (Wight).
A tree.
4. *JAMBOSA RAMA-VARMA*, n. comb. *Eugenia Rama-Varma*,
Bourd. in Ind. For. xxx, 147, t. 2.
W. Gháts, in the evergreen forests of Travancore and
Tinnevely, above 4,000 ft.
A medium-sized rare tree with white flowers, large leaves
and greenish-pink fruit.
5. *JAMBOSA LAETA*, Bl. *Eugenia laeta*, Ham.; F. B. I. ii. 479.
E. pauciflora, Wt. Ic. t. 526.
W. Gháts, in evergreen forests from S. Canara southwards,
up to 4,000 ft.
A medium-sized pretty tree with rather small leaves, white
petals and very long crimson stamens. Bark smooth,
white; wood brownish-grey, hard.
6. *JAMBOSA HEMISPHAERICA*, Walp. *Eugenia hemispherica*,
Wt.; F. B. I. ii. 477; Wt. Ic. t. 525; Bedd. Fl. t. 203.
W. Gháts, from S. Canara southwards, up to 3,000 ft., in
evergreen forests.
A large tree with white or rose-coloured flowers and purple
fruit. Bark smooth, blackish; wood brown, hard. Vern.
Tam. Vellei nyaral; *Mal.* Ven nyára.
7. *JAMBOSA BOURDILLONII*, Gamble in Kew Bull., 1918, 239.
W. Gháts, hills of Travancore at 2,000 ft. (Bourdillon).
A medium-sized tree.
8. *JAMBOSA VULGARIS*, DC. W. & A. 332; Wt. Ic. t. 435.
Eugenia Jambos, Linn.; F. B. I. ii. 474.
Cultivated in gardens and sometimes found run wild—
chiefly on old cultivations. The Rose-apple.
A small pretty tree with greenish-white flowers and pinkish-
white fruit, edible but not very good. Vern. *Hind.* Gulab
jaman.
9. *JAMBOSA OCCIDENTALIS*, Gamble n. comb. *Eugenia occi-*
dentalis, Bourd. in Ind. For. xxx. 195, t. 3.
W. Gháts, banks of the Periyar river and elsewhere, always
near water.
A small handsome bushy tree with large white flowers,
numerous stamens and greenish-pink globose fruit. Vern.
Tam. Atta sám̃ba.

10. JAMBOSA BEDDOMEI, Gamble n. comb. *Eugenia Beddomei*, Duthie in F. B. I. ii. 476.

W. Gháts, hills above Trichnagudi, S. Tinnevelly, at 4,000–5,000 ft. (Beddome).

A large tree with characteristic very coriaceous leaves and flowers in subterminal corymbs.

4. *Syzygium*, Gaertn.

Trees or shrubs. *Leaves* opposite, entire, glabrous, often pellucid-dotted. *Flowers* small, in terminal axillary or lateral cymes, usually corymbose; bracteoles small deciduous or 0. *Calyx*-tube turbinate or funnel-shaped, the limb 4- rarely 5-lobed; no thickened staminal disk. *Petals* 4–5, rounded, concave, usually falling off as a calyptrate lid, sometimes singly. *Stamens* very numerous, free, bent inwards at the middle when in bud. *Ovary* 2-celled, with several ovules in each cell; style 1; stigma simple. *Fruit* a 1-celled, 1- or few-seeded berry, globose pyriform or oblong, crowned by the calyx-limb. *Seeds* globose; cotyledons fleshy; radicle small, concealed between the cotyledons.

Cymes terminal and axillary, rarely from leafless axils:—

Petals usually free, though deciduous:—

Calyx-tube short, turbinate; leaves coriaceous, the nerves close together:—

Leaves with petioles .5 in. long, elliptic, caudate-acuminate at apex, acute at base, olive-green when dry, 2–3 in. long, 1–1.5 in. broad; flowers in dense cymes of umbellules, the branches tetragonous, buds .2 in. long; fruit oblong, .5 in. long

1. *Arnottianum*.

Leaves with petioles about .5 in. long, oblanceolate, obtuse at apex, cuneate at base, purplish when dry, .75–1.25 in. long, .5 in. broad; flowers in terminal corymbose cymes of umbellules, the branches tetragonous, buds .1 in. long.....2. *Myhendrae*.

Leaves sessile, ovate, obtusely acute at apex, cordate at base, nearly black when dry, 1.5–2.5 in. long, 1–1.25 in. broad; flowers in corymbs of umbellules 2.5 in. long, the branches tetragonous, buds .1 in. long.....3. *Benthamianum*

Calyx-tube elongate, funnel-shaped; leaves chartaceous or coriaceous, the nerves not always close together:—

Flowers usually in short rather few-flowered axillary racemes; calyx-tube .3–1 in. long; leaves elliptic or elliptic-oblong, acute to long-acuminate at apex, 3–5 in. long, 1–1.5 in. broad,

the nerves rather close and parallel; petals often many; fruit .5 in. long, scarlet.....4. *Wightianum*. Flowers in many-flowered terminal and axillary panicles of umbellules; calyx-tube under .3 in. long, greyish and gland-dotted:—

Leaves ovate, long-acuminate, up to 4 in. long, 1.5 in. broad, usually rounded at base, petiole .1–.2 in. long; flower pedicels short, slender; fruit .2 in. in diam.....5. *zeylanicum*.

Leaves linear-lanceolate, acuminate, up to 3 in. long, .5 in. broad, narrowed at base, petiole .5 in. long; flower pedicels elongate, slender.....6. *lineare*.

Flowers in umbels of 5–10 at the ends of the branchlets; calyx-tube resinous-scaly, about .2 in. long, the lobes minute; leaves elliptic-oblong, obtuse, narrowed at base, .3–.5 in. long, .2 in. broad, petiole .1 in. long; pedicels very short...7. *microphyllum*.

Petals usually falling in one piece, calyptrate:—

Cymes terminal, more or less corymbose, sometimes also axillary to upper leaves:—

Branchlets tetragonous; flowers small; calyx-tube scarcely .1 in. in diam., turbinate:—

Leaves very coriaceous, elliptic to obovate or even orbicular, up to 6 in. long, 3 in. broad, nerves distant and prominent, but scarcely parallel, petiole very short, thick; inflorescence branches stout; fruit small, globose.....8. *montanum*.

Leaves coriaceous, ovate-lanceolate, caudate-acuminate, up to 3 in. long, 1–1.5 in. broad, nerves close and parallel, petiole very short; inflorescence branches slender; fruit small, globose9. *rubicundum*.

Branchlets terete:—

Leaves more than 1 in. broad:—

Leaves membranous, elliptic-ovate or -lanceolate, caudate-acuminate, green when dry, up to 3.5 in. long, 1.5 in. broad, petiole slender, nerves parallel, close and regular; inflorescence branches slender, divaricate nearly at right angles

10. *Gardneri*.

Leaves coriaceous, obovate, obtuse or emarginate, dark brown when dry, up to 4 in. long, 1.5 in. broad, petiole very short, stout, nerves parallel, reticulate between them; inflorescence branches moderately thick, ascending

11. *caryophyllaeum*.

Leaves less than 1 in. broad:—

Leaves suborbicular or obovate, often slightly emarginate,

very coriaceous, up to 1 in. long, .75 in. broad, the nerves close; flowers in close terminal corymbs; calyx-tube ovoid, .15 in. long; fruit oblong or obovoid, up to .5 in. long

12. *calophyllifolium*.

Leaves obovate, abruptly obtusely acuminate at apex, cuneate at base, coriaceous, prominently glandular, up to 2 in. long, .75 in. broad, the nerves somewhat distant; flowers in lax terminal and axillary cymes; calyx-tube funnel-shaped, .35 in. long.....13. *palghatense*.

Cymes mostly axillary, occasionally terminal:—

Peduncles 2–4 in. long, their branches also long, ascending; leaves chartaceous, ovate, obtuse, narrowed at base and decurrent on the .75 in. long petiole, 3–4 in. long, 2–2.5 in. broad; nerves few, distant, irregular, joining in loops only; flower buds small, scarcely .1 in. in diam.....14. *travancoricum*.

Peduncles nearly 1 in. long, their branches stout, divaricating at right angles; leaves elliptic, usually abruptly acuminate at apex, narrowed at base, up to 6 in. long, 2.5–3.5 in. broad, long-petioled, nerves many, parallel, joining in an intramarginal nerve; flower-buds rather large, about .25 in. in diam.

15. *Chavaran*.

Cymes lateral, usually from the scars of fallen leaves, sometimes also axillary:—

Leaves alternate, suborbicular or ovate, very coriaceous, large, reaching 8 in. long or longer, 6 in. broad; flowers in cymes with divaricating branches, the calyx-mouth .2 in. in diam. petals calyptrate; fruit nearly spherical, about .5 in. in diam.

16. *alternifolium*.

Leaves opposite:—

Petals free; leaves obovate to obcordate, thin, pale on both sides, nearly glaucous beneath, the nerves distant, meeting in loops only; flowers very small in very short branching cymes; fruit spherical, .25 in. in diam.....17. *malabaricum*.

Petals united, calyptrate:—

Nerves of leaf irregular, distant, anastomosing near the margin, but not producing a clearly marked intramarginal nerve:—

Branchlets terete, pale; leaves broadly obovate, often nearly orbicular, subcoriaceous, 3–8 in. long, 2–4 in. broad; inflorescence 2–2.5 in. long, the branches rather stout; fruit globose or ovoid, .25–.5 in. in diam.

18. *operculatum* var. *obovatum*.

Branchlets tetragonous, dark; leaves elliptic or elliptic-oblong, membranous, 4-6 in. long, 2-3 in. broad; inflorescence about 4 in. long, the branches slender, angled.

19. *Stocksii*.

Nerves of leaf joining in a distinct intramarginal nerve:—

Large tree; leaves over 1 in. broad, variable in shape but usually 3-6 in. long, usually acuminate, sometimes abruptly, the nerves close and parallel; flowers somewhat large, the mouth of the calyx-tube .2 in. in diam.; fruit oblong ellipsoid or globose.....20. *Jambolanum*.

Shrub or small tree; leaves narrow, oblong, 3-4 in. long, under 1 in. broad, the nerves close but slightly irregular; flowers small, the mouth of the calyx-tube about .1 in. in diam.; fruit obovoid, .5 in. long, crowned with the cup-like calyx-limb.....21. *Heyneanum*.

1. *SYZYGIUM ARNOTTIANUM*, Walp. *S. densiflorum*, Wall.; W. & A. 329. *Eugenia Arnottiana*, Wt.; F. B. I. ii. 483; Wt. Ic. t. 999.

W. Gháts, in Shola forests of the Nilgiris, Anamalais, Pulneys and Travancore Hills, at high levels, rarely lower than 5,000 ft.

A large tree with red young leaves and buds, cream-coloured flowers and dark purple fruit. Bark grey rough; wood greyish-brown, hard and close-grained; useful for building and fuel; one of the most important of the hill woods. Vern. *Tam. Navál*, Nagay; *Mal. Ayri*.

2. *SYZYGIUM MYHENDRAE*, Gamble n. comb. *Eugenia Myhendrae*, Bedd. MS.; Brand. Ind. Trees, 325.

W. Gháts, in the evergreen forests of Travancore and Tinnevely, at 3,000-4,000 ft. (Beddome, Bourdillon).

A medium-sized handsome tree reaching 40 ft. in height, the flowers white, very small, the leaves small.

3. *SYZYGIUM BENTHAMIANUM*, Gamble n. comb. *Eugenia Benthamiana*, Wt. *E. Arnottiana* var. *Benthamiana*, Duthie in F. B. I. ii. 484.

W. Gháts, in the Nilgiri Hills, at Sispara, 6,000 ft. (Gardner).

Apparently a small tree or large shrub.

4. *SYZYGIUM WIGHTIANUM*, Wall.; W. & A. 330. *S. lanceolatum*, W. & A. 330. *Eugenia Wightiana*, Wt.; F. B. I. ii. 485; Wt. Ic. t. 529. *E. lanceolata*, Lam.; Wt. Ic. t. 530.

W. Gháts, in the Nilgiri, Pulney and Travancore Hills, at 2,000–4,000 ft.

A moderate-sized tree, with white flowers and scarlet fruit, showy when in full flower and fruit.

5. *SYZYGium ZEYLANICUM*, DC.; W. & A. 330; Wt. Ic. t. 73. *Eugenia zeylanica*, Wt.; F. B. I. ii. 485.

W. Gháts, from S. Canara to Travancore, in the lower country, on the banks of streams.

A handsome little tree with white flowers and edible white fruit. Vern. *Mal. Pula*.

6. *SYZYGium LINEARE*, Wall. *Eugenia linearis*, Duthie in F. B. I. ii. 486. *E. zeylanica*, Bedd. Fl. t. 202.

W. Gháts, in the S. Tinnevelly Hills, on river beds up to 3,500 ft.

A small tree, with white flowers.

7. *SYZYGium MICROPHYLLUM*, Gamble n. comb. *Eugenia microphylla*, Bedd.; F. B. I. ii. 505.

W. Gháts, in S. Travancore, on river banks, at 4,000–5,000 ft. (Beddome).

A small much-branched tree with very small leaves.

8. *SYZYGium MONTANUM*, Gamble n. comb. *Eugenia montana*, Wt. Ic. t. 1060; F. B. I. ii. 488.

W. Gháts, Shola forests of the Nilgiri Hills, above 5,000 ft., common.

A large evergreen tree with small white flowers in terminal corymbs, large leaves and purple fruit. Bark brown, granulated and peeling off in small flakes; wood greyish-brown, moderately hard, used for building. Vern. *Badaga*, *Poo nagay*.

9. *SYZYGium RUBICUNDUM*, W. & A. 330. *Eugenia rubicunda*, Wt.; F. B. I. ii. 495; Wt. Ic. t. 538. *E. lissophylla*, Duthie in F. B. I. ii. 488.

W. Gháts, in the Nilgiri Hills (G. Thomson), south to Tinnevelly and Travancore, up to 3,000 ft. in evergreen forests.

A medium-sized tree with rough branchlets, narrow leaves and small fruit. Bark thin, smooth, pale brown; wood reddish-brown, rough.

10. *SYZYGium GARDNERI*, Thw. *Eugenia Gardneri*, Duthie in F. B. I. ii. 489. *E. cymosa*, Lam. var. *rostrata*, Duthie in F. B. I. ii. 482.

W. Gháts, in the Anamalai, Travancore and Tinnevely Hills, up to 4,000 ft. in evergreen forests.

An enormous tree with slender branchlets, caudate leaves, white flowers and purple fruit. Bark smooth, white; wood dark reddish-brown with yellow patches, used for building in Travancore. Vern. *Tam.* Nir navál; *Mal.* Kari nyaral.

11. *SYZYGIUM CARYOPHYLLAEUM*, Gaertn.; W. & A. 329. *Eugenia caryophyllaea*, Wt.; Wt. Ic. t. 540; F. B. I. ii. 490.

W. Coast and W. Gháts from S. Canara southwards, up to 5,000 ft., especially near streams.

A small tree with white flowers and black globose fruit. Bark smooth, grey; wood brown, rather soft. Vern. *Mal.* Nyára.

12. *SYZYGIUM CALOPHYLLIFOLIUM*, Walp. *Eugenia calophyllifolia*, Wt.; Wt. Ic. t. 1,000; F. B. I. ii. 494.

W. Gháts, Shola forests of the Nilgiris above 6,000 ft., common and conspicuous.

A large evergreen tree with a rounded head, small leaves, white flowers and dark purple fruit. Bark thick, brown, rough; wood reddish-brown, hard and useful for building.

13. *SYZYGIUM PALGHATENSE*, Gamble in Kew Bull. 1918, 240.

W. Gháts, in the Palghat Hills of Malabar at 5,000 ft. (Beddome).

A large tree with conspicuously glandular leaves and long calyx-tube.

14. *SYZYGIUM TRAVANCORICUM*, Gamble in Kew Bull. 1918, 240.

W. Coast, in swampy places in the low country of Travancore, up to 200 ft. (Bourdillon).

A medium-sized or large tree with long-petioled leaves and small flowers in long-pedunculate corymbose axillary cymes.

15. *SYZYGIUM CHAVARAN*, Gamble n. comb. *Eugenia Chavaran*, Bourd. For. Trees Trav. 188.

W. Gháts, evergreen forests of N. Travancore at low elevations (Bourdillon).

A very large handsome tree with rather large white flowers, usually in axillary cymes, and large closely-nerved leaves. Wood useful, the trunks sometimes hollowed into boats. Vern. *Mal.* Chavaran.

16. SYZYGIUM ALTERNIFOLIUM, Walp. *Eugenia alternifolia*, Wt.; Wt. Ic. t. 537; F. B. I. ii. 497; Bedd. Fl. t. 198.

Deccan, in the hills of Kurnool, Cuddapah and N. Arcot. A large tree with large alternate or subopposite leaves, yellowish-white scented flowers and globose fruit. The wood is dark red, hard and close-grained, and is in considerable demand for building purposes. Vern. *Tel.* Manchi moyadi, Mogi.

17. SYZYGIUM MALABARICUM, Gamble n. comb. *Eugenia malabarica*, Bedd. Fl. t. 199; F. B. I. ii. 497.

W. Gháts, in the Wynaad forests of Malabar at 2,000-4,000 ft., generally in swampy places.

A medium-sized tree with very small flowers in short lateral cymes and small globose fruit, the leaves pale when dry.

18. SYZYGIUM OPERCULATUM, Gamble n. comb. *Eugenia operculata*, Roxb.; F. B. I. ii. 498; Wt. Ic. t. 552. *E. cerasoides*, Roxb.; Wt. Ic. t. 615.

Var. *obovatum*. *E. operculata* var. *obovata*, Duthie in F. B. I. ii. 498.

N. Circars, forests of Gumsúr.

A moderate-sized tree of rather dry grassy localities, usually in or near the Sál forests, the leaves turning red in the cold season, the flowers greenish, the fruit purple small and edible. Bark grey or light brown; wood reddish-grey. Vern. *Hind.* Piaman.

19. SYZYGIUM STOCKSII, Gamble n. comb. *Eugenia Stocksii*, Duthie in F. B. I. ii. 498.

W. Gháts, Wynaad forests about 3,000 ft. (Beddome).

A large tree with small flowers in axillary as well as lateral corymbose cymes.

20. SYZYGIUM JAMBOLANUM, DC.; W. & A. 329. *Eugenia Jambolana*, Lam.; F. B. I. ii. 499; Wt. Ic. t. 535; Bedd. Fl. t. 197. *E. caryophyllifolia*, Lam.; Wt. Ic. t. 553.

All forest Districts, both in the plains and in the hills up to 6,000 ft., usually along river banks and in moister localities, but found even on coast sands on the one side and in W. Ghát Sholas on the other. Often cultivated in avenues and topes and for its fruit.

A large evergreen tree with white flowers and purple fruit,

the latter in cultivation oblong and edible, good in tarts and puddings, in a wild state usually small and more or less globose. Bark smooth, light grey; wood hard, reddish-grey, useful for building and agricultural purposes. Vern. *Hind.* Jaman; *Ur.* Jamo; *Tel.* Neredu; *Tam.* Naval; *Kan.* Narala; *Mal.* Naga.

var. *axillare*, leaves thin, obovate, abruptly acuminate; flowers small, in axillary or lateral cymes; fruit globose, .2 in. in diam.

W. Gháts, lower hills of Travancore, in evergreen forests (Bourdillon).

21. *SYZYGIUM HEYNEANUM*, Wall. *Eugenia Heyneana*, Duthie in Fl. Br. Ind. ii. 500. *E. salicifolia*, Grah.; Wt. Ic. t. 539.

N. Circars and Deccan, in river-beds and along streams, westwards to Coorg, also in S. Travancore.

A large shrub or small tree with white flowers and narrow leaves.

5. *Eugenia*, Linn.

Trees or shrubs. *Leaves* opposite, entire, pellucid-dotted. *Flowers* moderate-sized, solitary or in fascicles or short cymes, axillary or terminal; bracteoles 2, below the calyx-tube, usually persistent. *Calyx*-tube nearly globose, not produced beyond the ovary, the limb of 4, rarely 5, persistent lobes; staminal disk, if present, broad. *Petals* 4, rarely 5, distinct. *Stamens* numerous, distinct. *Ovary* 2-celled, the cells often again divided by false partitions, ovules several in each cell; style slender; stigma simple. *Fruit* a nearly globose, 1- or 2-celled berry, crowned with the calyx-lobes. *Seeds* 1-2, large; cotyledons thick, partially combined; radicle very minute, scarcely distinguishable.

Young parts and inflorescence fulvous- or silvery-pubescent:—

Staminal disk broad:—

Leaves large, elliptic or obovate or suborbicular, very coriaceous, 3-5 in. long, 2-3.5 in. broad, floccose near the base when young like the innovations; flowers large, tawny-velvety, about 1 in. in diam., solitary or in short few-flowered terminal cymes; fruit about .5 in. in diam., densely tomentose.....1. *floccosa*.

Leaves usually under 3 in. long:—

Flowers on fairly long pedicels; leaves coriaceous:—

Pedicels solitary, .5-1 in. long, axillary or lateral among the leaves; leaves oblanceolate, obtuse, 1-2 in. long, .75 in. broad,

the margins revolute, nerves obscure; fruit .2 in. in diam., rusty-tomentose2. *Jossinia*.
 Pedicels about 1 in. long, in axillary pairs on a short peduncle; leaves elliptic to obovate, acute, 2.5-4 in. long, 1-1.25 in. broad, nerves rather prominent beneath with reticulation between; fruit about .5 in. in diam., glabrous...3. *calcadensis*.
 Pedicels .3 in. long, in pairs on the young branchlets below the leaves; leaves obovate, obtusely abruptly acuminate at apex, acutely attenuate at base, the margins decurrent, 1.5-2.5 in. long, .75-1.25 in. broad, nerves slender, not prominent.....4. *discifera*.

Flowers in nearly sessile clusters; leaves ovate to orbicular, obtuse or retuse, shining, 1.5-2.5 in. long, 1-1.75 in. broad, nerves few, distant, prominent; fruit globose, grey-tomentose, .25 in. in diam.....5. *codyensis*.

Staminal disk not enlarged:—

Flowers fascicled in the leaf-axils or in very short cymes:—

Leaves coriaceous, narrowly oblanceolate, obtusely acuminate at apex, the base acuminate, margin recurved, 1-2 in. long, .25-.5 in. broad, nerves very oblique, not prominent; peduncles filiform, .3-.5 in. long, fascicled.....6. *Rottleriana*.

Leaves subcoriaceous, elliptic or ovate, obtusely acute, narrowed at base, margins recurved, 1.5-2.5 in. long, .75-1.25 in. broad, nerves obscure; peduncles rusty-villous, fascicled cymose or sometimes solitary, about .4 in. long; fruit globose, glabrous, about .4 in. long.....7. *bracteata*.

Flowers solitary in the leaf-axils; pedicels .5-1 in. long; leaves short-petioled, lanceolate, long-acuminate, rounded at base, silvery-pubescent beneath, 4-5 in. long, .75-1.25 in. broad, nerves prominent, rather distant, at right angles to midrib; fruit globose, shortly appressed-pubescent, about .6 in. in diam.....8. *argentea*.

All parts glabrous or nearly so:—

Leaves ovate, caudate-acuminate, rounded or acute at base, up to 2.5 in. long, 1 in. broad, petiole .2 in. long, slender; flowers solitary or in pairs, axillary or lateral, pedicels slender, .3 in. long; fruit globose, glabrous, .5 in. in diam.....9. *Mooniana*.

Leaves ovate, obtusely acute or retuse, cordate at base, up to 3 in. long, 2 in. broad, petiole very short, thick; flowers in short terminal crowded racemes, slightly pubescent10. *singampattiana*.

1. *EUGENIA FLOCCOSA*, Bedd. Fl. t. 200; F. B. I. ii. 501.

W. Ghâts, in the S. Tinnevely Hills at 3,000-4,000 ft. (Beddome).

A good-sized tree with white flowers, very velvety on the petals, large leaves and tomentose fruit.

2. *EUGENIA JOSSINIA*, Duthie in F. B. I. ii. 500. *Jossinia indica*, Wt.; Wt. Ic. t. 523.

W. Gháts, in the Sivagiri and Courtallum Hills of Tinnevely.

A small tree or shrub.

3. *EUGENIA CALCADENSIS*, Bedd. Ic. t. 162; F. B. I. ii. 502.

W. Gháts, Nilgiris at Sispara, Silent Valley in Malabar at 3,000 ft., Calcad Hills of S. Tinnevely at 2,000 ft. (Beddome).

A very pretty little tree with showy white flowers in pairs.

4. *EUGENIA DISCIFERA*, Gamble in Kew Bull. 1918, 239.

W. Gháts, hills of Travancore near Chimunji at 4,000 ft. (Bourdillon).

A small tree, the disk of the flowers broad and conspicuous.

5. *EUGENIA CODYENSIS*, Munro; F. B. I. ii. 501.

W. Gháts, from Coorg and S. Canara to Nilgiris and Travancore, in evergreen forests, at about 3,000 ft.

A shrubby little tree with greenish-white flowers.

6. *EUGENIA ROTTLERIANA*, W. & A. 331; F. B. I. ii. 502; Wt. Ic. t. 100.

W. Gháts, in the evergreen forests of Tinnevely and Travancore at 4,000 ft.

A pretty little tree with small flowers.

7. *EUGENIA BRACTEATA*, Roxb.; F. B. I. ii. 502; W. & A. 331; Wt. Ill. t. 13. *E. Willdenowii*, Wt.; Wt. Ic. t. 545.

E. Coast, common on coast sandhills and in evergreen scrub forest from the Chilka Lake southwards; often cultivated in gardens.

A shrub, resembling myrtle, with pretty white flowers and red berries. Bark yellowish-grey, smooth; wood grey, hard, close-grained. Vern. *Ur*. Sagarabatna; *Tel*. Arivita; *Tam*. Kaya.

8. *EUGENIA ARGENTEA*, Bedd.; F. B. I. ii. 503.

W. Gháts, in the Wynaad forests of Malabar at 3,000 ft. (Beddome).

A shrub or small tree with silvery leaves and conspicuous filiform bracteoles under the calyx-tube.

9. *EUGENIA MOONIANA*, Wt.; Wt. Ic. t. 551; F. B. I. ii. 505.

W. Gháts, from S. Canara southwards, at 2,000–4,000 ft.

A small tree with white flowers and globose crimson fruit.

10. *EUGENIA SINGAMPATTIANA*, Bedd. Ic. t. 273; F. B. I. ii. 506.
W. Gháts, in the Singampatti Hills of Tinnevely at 3,000 ft.,
in moist forests.

A small dense tree with white flowers.

6. *Meteoromyrtus*, Gamble.

Small tree or shrub. *Leaves* opposite, membranous, penninerved, villous when young. *Flowers* small, solitary, on axillary or supra-axillary pedicels, villous; bracteoles 2, linear, below the calyx-tube and longer than it. *Calyx*-tube short, not produced beyond the ovary, furnished with an annular disk at the mouth; lobes 4, lanceolate, villous, rather longer than the petals. *Petals* 4, suborbicular, pellucid-punctate. *Stamens* indefinite, inserted in a ring on the disk; anthers small, opening longitudinally. *Ovary* 2-celled, about 4-ovuled in each cell, the ovules pendulous from its apex; style elongate; stigma subcapitate. *Fruit* not yet known.

METEOROMYRTUS WYNAADENSIS, Gamble in Kew Bull. 1918, 241. *Eugenia wynaadensis*, Bedd. Ic. t. 161; F. B. I. ii. 506.

W. Gháts, about Devala in S.E. Wynaad, at 2,000–3,000 ft.

A small tree or large shrub with oblong, lanceolate, acuminate leaves, villous when young, afterwards glabrous, the rather distant nerves meeting in a looped intramarginal nerve; flowers on slender pedicels usually supra-axillary, with long linear bracteoles and lanceolate calyx-lobes, the petals pellucid-punctate and ciliate.

7. *Eucalyptus*, L'Hér.

Trees. *Leaves* usually opposite when young, when old different in shape and usually alternate, coriaceous, entire, penninerved. *Flowers* on axillary peduncles, solitary or in umbels or heads of 3-many; bracts deciduous. *Calyx*-tube turbinate or campanulate, adnate at the base to the ovary, truncate at apex, sometimes with very small lobes. *Petals* 5, united in a calyptra which falls off by the pressure of the growing stamens. *Stamens* many, free, many-seriate; filaments filiform; anthers small. *Ovary* inferior, 3–4-celled; many ovules in each cell, subhorizontal; style slender;

stigma small. *Fruit* a hardened capsule, dehiscing loculicidally at the mouth. *Seeds* small, angular or linear-cuneate; testa membranous; cotyledons longer than the radicle.

EUCALYPTUS GLOBULUS, Labill.

An introduction from Australia, largely grown in forests on the Nilgiris and other hills of the W. Gháts and frequently found self-sown. The Blue Gum.

A lofty tree with very grey young leaves and narrow, green, linear-lanceolate, curved, vertically hanging old ones, white rather large flowers and rugose capsule, all parts very aromatic with a valuable essential oil which is largely extracted. Bark grey, the outer layers deciduous; wood grey with darker streak, smoderately hard, used in building but most especially for fuel.

Many other species of the genus are also found cultivated in gardens and plantations on the S. Indian hills.

Family LXIV. LECYTHIDACEAE.

Trees. *Leaves* alternate, entire or shortly toothed, usually crowded at the ends of the branchlets; stipules 0. *Flowers* large, solitary or in axillary or terminal racemes. *Calyx*-tube enclosing the ovary; lobes usually 4-6, rarely 2-3, valvate or imbricate. *Petals* 4-6, rarely more or 0. *Stamens* many, in several series; filaments slender; anthers small, sometimes wanting. *Ovary* 2-6, rarely more-celled, many-ovuled, the ovules pendulous or horizontal; style long, slender; stigma capitate. *Fruit* a woody, fleshy or fibrous berry, with 1 or many seeds.

Fruit angular, fibrous, 1-seeded; stamens all perfect

1. Barringtonia.

Fruit globose or ovoid, fleshy, many-seeded; stamens partly without anthers.....2. **Careya.**

1. Barringtonia, Forst.

Trees. *Leaves* alternate, usually membranous, entire or crenate-serrate, penninerved. *Flowers* in elongate, terminal or lateral, racemes or interrupted spikes; bracts small, deciduous; bracteoles minute or 0. *Calyx*-tube scarcely produced above the ovary; limb of 2-4, rarely 5, lobes; lobes imbricate or valvate. *Petals* 4, rarely 5, imbricate, adnate at base to the staminal tube.

Stamens very numerous, in many rows, connate below; filaments filiform, all bearing anthers. *Ovary* inferior, 2-4-celled; ovules 2-8 in each cell, pendulous or horizontal; style long, filiform; stigma small. *Fruit* a fibrous berry, globose ovoid or quadrangular, crowned by the persistent calyx-limb, 1-seeded. *Seed* ovoid or ellipsoid, exalbuminous; embryo large, cotyledons rudimentary.

Calyx-lobes valvate; fruit large, about 2 in. long, ovoid; flowers large, 1.5-2 in. in diam.; leaves large, up to 12 in. long....1. *racemosa*. Calyx-lobes imbricate; fruit medium-sized, about 1 in. long, quadrangular; flowers rather small, .3-.5 in. in diam.; leaves up to 6 in. long.....2. *acutangula*.

1. BARRINGTONIA RACEMOSA, Roxb.; F. B. I. ii. 507; W. & A. 333; Wt. Ic. t. 152.

W. Coast, in Malabar and Travancore, along backwaters, often planted for ornament.

A medium-sized ornamental tree with large flowers, cream-coloured with pink stamens, in pendulous racemes, and large brownish-red fruits. Wood white, soft, porous. Vern. *Tam.* Samuthram; *Mal.* Samuthraccham.

2. BARRINGTONIA ACUTANGULA, Gaertn.; F. B. I. ii. 508; W. & A. 333; Bedd. Fl. t. 204.

E. & W. Coast Districts along streams and on swampy land; more scarce inland in the Deccan and Carnatic.

A medium-sized tree, conspicuous for its long pendent racemes of pink flowers, succeeded by angular fruits, leaves obovate. Bark dark brown, rough; wood white, soft, with a pretty silver-grain, used for furniture. Vern, *Hind.* Ijal; *Ur.* Hinjolo; *Tel.* Kurpa; *Tam.* Adampa; *Mal.* Nir perzha.

2. Careya, Roxb.

Trees or a small undershrub. *Leaves* alternate, membranous, crowded at the ends of the branches, penninerved, crenate-serrate, *Flowers* large, showy, in racemes or interrupted spikes. *Calyx*-tube campanulate or funnel-shaped, hardly produced beyond the ovary; limb 4-lobed, the lobes imbricate. *Petals* 4, imbricate, much longer than the calyx-lobes. *Stamens* very numerous, in several rows, slightly connate at base; filaments very long, innermost and outermost without anthers. *Ovary* inferior, 4-5-

celled, crowned by an annular disk; ovules many, in 2 rows in each cell, on vertical axile placentas; style long, filiform; stigma small. *Fruit* a large globose fibrous berry, crowned by the persistent calyx-limb. *Seeds* numerous, in fleshy pulp; albumen 0; embryo large with obsolete cotyledons.

CAREYA ARBOREA, Roxb. Cor. Pl. t. 218; F. B. I. ii. 511; W. & A. 334; Wt. Ill. tt. 99 and 100; Bedd. Fl. t. 205.

All Forest Districts, in deciduous forest, especially in N. Circars, up to 5,000 ft., conspicuous in grassy places.

A large deciduous tree with yellowish-white flowers, large obovate-serrate leaves and large globular fruit. Bark thick, dark grey, gives a good fibre and makes slow matches; wood red, hard, of good quality but little used. Vern. *Hind.*, *Ur*. Kumbi; *Tel*. Gadava, Dudippi; *Tam*. Ayma; *Mal*. Perzha.

Family LXV. MELASTOMACEAE.

Herbs or shrubs, sometimes climbing, rarely trees. *Leaves* opposite or rarely whorled, entire or nearly so, often ribbed from the base; stipules 0. *Flowers* regular, hermaphrodite, in spikes panicles or corymbs, rarely solitary or fascicled, usually bracteate and bracteolate. *Disk* sometimes present. *Calyx*-tube free or partly or entirely adherent to the ovary; limb 4-5-lobed, sometimes calyptrate. *Petals* as many as the calyx-lobes, inserted on the margin of the tube, imbricate. *Stamens* as many or often twice as many as the petals and inserted with them; filaments bent inwards in bud, often alternately shorter and longer; anthers 2-celled, basifixed, dehiscence usually by terminal pores, sometimes by slits; connective often appendaged near the base. *Ovary* 4-5-, rarely 3- or 6- or 1-celled; ovules usually numerous, on axile parietal or central placentas, sometimes few; style terminal, usually filiform. *Fruit* usually enclosed in the calyx-tube, capsular or baccate, dehiscent irregularly or by slits at the top of the cells. *Seeds* many (usually 1 in *Memecylon*); albumen 0; cotyledons small (in *Memecylon* large and convolute).

Leaves 3- or more-ribbed from the base; ovary 4-5-celled, ovules and seeds many:—

Petals 4 or 5:—

Seeds curved; flowers usually large and often showy:—

Stamens equal; fruit opening by pores at its apex

1. **Osbeckia.**

Stamens unequal; fruit bursting irregularly 2. **Melastoma.**

Seeds straight, stamens equal:—

Flowers moderately large, fleshy and red, petals 4; climber

3. **Kendrickia.**

Flowers rather small, pink or white, somewhat fleshy; epiphytic shrubs 4. **Medinilla.**

Petals 3; seeds straight; stamens equal; inflorescence scorpioid; herbs 5. **Sonerila.**

Leaves not ribbed but penninerved with faint intramarginal nerves; ovary 1-celled, few-ovuled; seed 1 6. **Memecylon.**

1. **Osbeckia**, Linn.

Herbs, undershrubs or shrubs, usually erect, branches usually 4-angled. *Leaves* opposite or sometimes ternate, entire, 3-7- or sometimes 9-ribbed. *Flowers* terminal, solitary capitate or paniced, purple-pink or white, often conspicuous; bracts conspicuous, sometimes involucrate. *Calyx*-tube urceolate or subglobose, sometimes much produced beyond the ovary, usually covered with bulbous-based bristles which are solitary or in sessile or stalked clusters or on pectinate scales; lobes 4 or 5, subulate or lanceolate, variously bristly, alternating with as many appendages usually stellately bristly. *Petals* 4 or 5, usually broadly obovate, ciliate. *Stamens* 8 or 10, equal or subequal; anthers oblong, truncate attenuate or beaked. *Ovary* semi-inferior, 4-5-celled, bristly at apex; ovules numerous in each cell on placentas radiating from the axis; style long, simple. *Fruit* a capsule opening by pores at its apex. *Seeds* many, curved, minutely tuberculate.

Flowers pentamerous (also, sometimes, *O. cupularis*); anthers attenuate at tip:—

Calyx-tube with simple bristles only; leaves 3-5-ribbed, outer pair of ribs very slender:—

Leaves elliptic, .5-1 in. long, .5 in. broad, acute at apex, obtuse at base, pale greenish when dry, bristles on upper surface many small adnate, also few large adnate only at base; branchlets strigose; calyx-lobes ovate, obtuse, appendages very short with only about 3 bristles 1. *minor*.

Leaves elliptic, 1-1.75 in. long, .5-1 in. broad, acute at apex, acute or obtuse at base, yellowish-green when dry, bristles on upper

surface distant, lineolate, thick, completely adnate except a minute mucro; branchlets glabrous; calyx-lobes ovate-lanceolate, acuminate, appendages triangular with few bristles, one long

2. *lineolata*.

Leaves oblong-lanceolate, 1-2.25 in. long, .5-.75 in. broad, acute at apex, obtuse at base, slightly yellowish when dry, bristles on upper surface slender, adnate except a short point; branchlets scabrous; calyx-lobes ovate oblong, rounded and stellately bristled at apex, ciliate on margins and with few bristles on back, appendages short with a small tuft.....3. *aspera*.

Calyx-tube with simple bristles below, tufts above; leaves 3-7-ribbed, outer pair slender:—

Calyx-lobes broad, obtuse or retuse, appendages cylindrical with a tuft of many bristles:—

Calyx-lobes many-bristly at apex and in a line on back; leaves elliptic, acute at apex, rounded at base, 1-1.5 in. long, .75 in. broad, bristles on upper surface slender, half adnate, half free; ribs 3 with a slender intramarginal pair.....4. *courtallensis*.

Calyx-lobes few-bristly at apex only; leaves lanceolate, acuminate at apex, narrowed at base, 2-4 in. long, 1-1.5 in. broad, bristles on upper surface sparse, slender, half adnate; ribs 5-7, the outer 2 pairs slender.....5. *Kleinii*.

Calyx-lobes short, acute, few-bristly at apex, appendages short, cylindrical with about 3 bristles; leaves lanceolate, acuminate, 1-2 in. long, bristles on upper surface few, slender, adnate below; ribs 5, the outer pair intramarginal.....6. *Lawsoni*.

Calyx-tube with conspicuous tufts of bristles, rarely simple at the base only:—

Tufts of bristles sessile as are appendages; calyx-lobes ovate, obtuse, bristly at apex, ciliate on margins; branchlets fleshy, glabrous, bluish when dry; leaves oblong-lanceolate, 1-1.5 in. long, .3-.5 in. broad, 3-ribbed, lineolate on upper, nearly glabrous on lower surface.....7. *sublaevis*.

Tufts of bristles stalked as are appendages:—

Stalks of bristle-tufts and appendages very short, the bristles woolly, the tufts large, .5-1 in. broad; leaves ovate, densely tawny-bristly on both surfaces, reticulate; ribs 7-9

8. *reticulata*.

Stalks of bristle-tufts and appendages elongate:—

Shrubs with many branches; leaves 5-ribbed:—

Calyx-lobes obtuse or emarginate at apex, the bristles pale and bulbous-based:—

Stems grey, with long retrorse stiff bristles; leaves lanceolate, acuminate, 3-4 in. long, 1 in. broad, the bristles on the upper surface few, long, adnate below in branched lineoles.....9. *travancorica*.

Stems reddish with short, stiff, appressed bristles; leaves elliptic, acute, 1-3·5 in. long; 1·5-2 in. broad, the bristles on the upper surface close, velvety, shortly adnate below

10. *Wightiana*.

Calyx-lobes acute at apex, the bristles rufous, always in tufts; leaves 1-1·5 in. long, 1·5-1 in. broad, the bristles on the upper surface few, only little adnate below

11. *Leschenaultiana*.

Slender shrubs with few erect branches and scarcely woody stems; calyx-lobes acute, ending in a stellate tuft of bristles; leaves lanceolate, acute, 3-ribbed, 1-2 in. long, 3-8 in. broad, sparsely bristly to nearly glabrous above, glabrous beneath except on nerves.....12. *octandra*.

Calyx-tube with thin, flattened, rather sparse pectinate scales, the appendages similar, lobes lanceolate, acuminate, 3 in. long; leaves lanceolate, long-petioled, 5-ribbed, up to 5 in. long, 1·5 in. broad, shortly scabrous on both surfaces.....13. *wynaadensis*.

Flowers usually tetramerous (4- or 5-merous in *O. cupularis*):—

Anthers gradually attenuate upwards; erect undershrubs with 4-angled stems and fruiting calyx constricted above:—

Densely hispid; leaves opposite, oblong-lanceolate; calyx-tube with scattered tufts of bristles, lobes oblong, glabrous except at apex, margins prominently ciliate-bristly, appendages branched

14. *hispidissima*.

Nearly glabrous; leaves usually in threes, linear-lanceolate, sparsely hispid-ciliate on margins and ribs; calyx-tube glabrous, the lobes with few short ciliate bristles, the appendages slender, not bristly.....15. *rostrata* var. *pulchella*.

Anthers abruptly beaked, the beaks slender; herbs or small undershrubs with 4-angled stems:—

Calyx-tube glabrous, lobes white-ciliate on the margins, appendages short and broad with pectinate bristles; leaves linear-lanceolate.....16. *chinensis*.

Calyx-tube with both simple and stellate bristles, lobes ciliate, the apices stellate-bristly, as are the slenderly stalked appendages; leaves oblong-lanceolate.....17. *zeylanica*.

Anthers short, truncate at apex; herbs or small undershrubs, the stems terete or slightly 4-angled:—

Calyx-tube in fruit .15 in. long with 4 short lobes, each with a stellate cluster of bristles at tip, appendages similarly crowned on very short stalks; leaves elliptic, subacute, up to 2 in. long, 1 in. broad, drying greenish.....18. *truncata*.

Calyx-tube in fruit .25 in. long with 4 or 5 triangular lobes, each with a stellate cluster of bristles at tip, appendages long-stalked, stellately bristle-tipped; leaves elliptic or elliptic-ovate, acute, up to 1.5 in. long by .75 in. broad, drying yellowish...19. *cupularis*.

Calyx-tube in fruit .25 in. long with triangular ciliolate lobes; leaves narrowly lanceolate, 2-3 in. long, about .5 in. broad, strigosely hairy above, shortly hispid beneath 20. *gracilis*.

1. OSBECKIA MINOR, Triana. *O. aspera*, Wt. Ic. t. 377.

W. Coast, in Travancore (Wight, Horsley).

A small shrub with small whitish-hairy leaves and purple-red flowers.

2. OSBECKIA LINEOLATA, Gamble in Kew Bull. 1918, 241.

W. Gháts, Nilgiri and Pulney Hills, at high levels, up to 6,000 ft.

A small erect shrub with glaucous branches and leaves drying yellowish-green, the upper surface with large lineoles, flowers purple-red.

3. OSBECKIA ASPERA, Blume; F. B. I. ii. 519 *in part*; W. & A. 323 *in part*.

W. Gháts, Courtallum in Tinnevely Hills (Mitchel).

A small undershrub with purple flowers.

4. OSBECKIA COURTALLENSIS, Gamble in Kew Bull. 1918, 242.

W. Gháts, Courtallum in Tinnevely (Wight).

A small shrub with red-purple flowers.

5. OSBECKIA KLEINII, W. & A. 323 *in note*. *O. aspera*, Bl. var. *Kleinii*, C. B. Clarke in F. B. I. ii. 519.

W. Coast, in Cochin and Travancore.

An erect undershrub with purple-red flowers in terminal leafy panicles and rather large leaves, sparsely bristly.

6. OSBECKIA LAWSONI, Gamble in Kew Bull. 1918, 242.

W. Gháts, Murchison in Travancore, at 2,000 ft. (Lawson).

A small erect undershrub with purple flowers in short terminal panicles.

7. OSBECKIA SUBLAEVIS, Cogn. in DC. Monog. vii. 321.

W. Gháts from Mysore to Nilgiris, on rocks at about 7,000 ft.

A small fleshy shrub with smooth glabrous glaucous bluish branches and bright purple flowers in small terminal corymbose cymes.

8. OSBECKIA RETICULATA, Bedd.; Fl. Br. Ind. ii. 520.
O. alveolata, Bedd. Ic. t. 168.

W. Gháts, in the Anamalais and Pulneys, at 6,000–7,000 ft.

A large, very handsome shrub reaching 10–15 ft. in height, the whole plant except the deep purple petals covered with ferruginous hairs.

- 9 OSBECKIA TRAVANCORICA, Bedd. ex Gamble in Kew Bull. ined.

W. Gháts in the lower hills of Travancore (Beddome).

An undershrub easily known by its stems being clothed with long retrorse bristles.

10. OSBECKIA WIGHTIANA, Benth.; F. B. I. ii. 419; W. & A. 323; Wt. Ic. t. 998.

W. Gháts, in the Nilgiri, Anamalai and Pulney Hills, at 4,000–7,000 ft., often in rocky places.

A much-branched shrub reaching 8 ft. or more in height, with handsome purple flowers and pale-brown silky foliage, the leaves whitish beneath, like the calyx-tube.

11. OSBECKIA LESCHENAULTIANA, DC.; F. B. I. ii. 520.
O. Gardneriana, Wt. Ic. t. 997.

W. Gháts, in the Nilgiri and Pulney Hills, at 6,000–8,000 ft., in damp places.

A branching shrub 8–10 ft. high with handsome purple flowers in terminal capitate heads, the calyx and small leaves with rufous hairs.

12. OSBECKIA OCTANDRA, DC.; F. B. I. ii. 521. *O. virgata*, Don in W. & A. 323; Wt. Ic. t. 376.

W. Gháts, from the Nilgiris to Travancore, at about 3,000 ft.

A slender undershrub with small purple flowers and dark foliage, the leaves lanceolate.

13. OSBECKIA WYNAADENSIS, C. B. Clarke in F. B. I. ii. 521.

W. Gháts, in Wynaad, at about 4,000 ft.

A slender erect undershrub with purple flowers in sub-terminal corymbs, large long-petioled leaves and very characteristic comb-like scales on the calyx-tube.

14. OSBECKIA HISPIDISSIMA, Wt. Ic. t. 1612; F. B. I. ii. 516.

N. Circars, Mahendragiri Hill in Ganjam, 4,500 ft.

(Gamble), Madgol Hills of Vizagapatam, at 5,000 ft. (A. W. Lushington). Deccan, in Mysore, at Wostara (Cleghorn). A very hispid erect undershrub with large crimson flowers.

15. *OSBECKIA* *ROSTRATA*, D. Don; F. B. I. ii. 517.

Var. *pulchella*, Triana. *O. recalva*, Bedd. M.S. in Herb. Kew and B.M.

Carnatic, in the Sirumalai Hills, at 3,500 ft., in swampy places (Beddome).

An erect glabrous shrub reaching 4-6 ft. high, with rosy-purple flowers.

16. *OSBECKIA* *CHINENSIS*, Linn.; F. B. I. ii. 515.

N. Circars, Madgol Hills of Vizagapatam, about 4,000 ft. (A. W. Lushington).

An erect slender undershrub, reaching about 2 ft. in height with pale mauve flowers in capitate leafy heads.

17. *OSBECKIA* *ZEYLANICA*, Willd.; F. B. I. ii. 516; W. & A. 322.

N. Circars, Deccan and Carnatic, especially near the coast.

An erect annual herb with small purple mauve flowers in leafy capitate heads.

18. *OSBECKIA* *TRUNCATA*, Don in W. & A. 322; F. B. I. ii. 514; Wt. Ic. t. 375.

W. Coast from S. Canara to Travancore.

An erect annual herb with small purple flowers.

19. *OSBECKIA* *CUPULARIS*, Don in W. & A. 323; F. B. I. ii. 514. *O. Leschenaultiana*, Wt. Ic. t. 996, not of DC.

W. Gháts, from Coorg to Nilgiris and Pulneys, at 3,000-7,000 ft., in grass.

A herbaceous plant from a perennial rootstock, the flowers white tinged with pink, calyx-lobes and petals as often 5 as 4.

20. *OSBECKIA* *GRACILIS*, Bedd. in Trans. Linn. Soc. xxv. 216; F. B. I. ii. 518.

W. Gháts, Sispara Ghát, in the W. Nilgiris, at 4,000 ft. (Beddome).

An erect slender plant with purple flowers in few-flowered terminal panicles and narrow leaves, the calyx-tube greyish-blue when dry.

2. Melastoma, Linn.

Shrubs, usually erect and bristly. *Leaves* opposite, entire, petioled, elliptic or lanceolate, 3-7-ribbed. *Flowers* terminal, solitary or in clusters or panicles, large, purple or sometimes rose or white, usually 5-merous; bracts conspicuous. *Calyx*-tube ovoid or campanulate, covered with strigose or paleaceous hairs; lobes ovate or lanceolate, alternating with subulate appendages. *Petals* as many as calyx-lobes, broadly obovate, large. *Stamens* 10, alternately long, opposite calyx-lobes, with purple anthers and the connective produced at the base to end in two lobes and shorter opposite petals with yellow anthers and connective not produced but with 2 tubercles in front. *Ovary* ovoid, more or less adnate to the calyx-tube; ovules numerous; style simple. *Fruit* an irregularly dehiscent or soft berry-like capsule. *Seeds* minute, numerous, curved, minutely punctate.

MELASTOMA MALABATHRICUM, Linn.; F. B. I. ii. 523; W. & A. 324; Wt. Ill. t. 95.

E. & W. Coast Districts, rarer inland, in wet places and on the banks of streams, up to 6,000 ft.

A handsome shrub with large red-purple flowers, the calyx-tube covered with pale paleaceous scales.

3. Kendrickia, Hook f.

An epiphytic climbing shrub, climbing like ivy with stem rootlets. *Leaves* opposite, petioled, fleshy, with two pairs of nerves, one from the base, the other from the midrib short way up. *Flowers* large in few-flowered terminal umbels; peduncles stout, 2-bracteolate. *Calyx*-tube urceolate, fleshy, slightly produced beyond the ovary, rose-purple; limb of 4 short fleshy lobes, greenish. *Petals* 4, fleshy, red, spreading. *Stamens* 8, equal, anthers opening at the summit by one pore; connective with a horn-like process at the base. *Ovary* inferior, 4-6-celled; ovules numerous; style simple, stout. *Fruit* a globose capsule, 1-celled by the absorption of the septa, opening at the apex by 4-6 valves. *Seeds* very many, minute, prismatic.

KENDRICKIA WALKERI, Hook. f.; F. B. I. ii. 526; Bedd. Ic. t. 271.

W. Gháts, in the Anamalai Hills (Beddome), otherwise a Ceylon plant.

A very ornamental ivy-like climber, the lower stems adhering by rootlets, the branches free and pendent, the leaves various in shape.

4. *Medinilla*, Gaud.

Erect or scandent, often epiphytic, branching shrubs. *Leaves* opposite or whorled, entire, often fleshy, ribbed from the base of the blade. *Flowers* pink or white, in terminal panicles or axillary or lateral cymes, 4-5- rarely 6-merous, sometimes solitary; bracts sometimes coloured, usually deciduous. *Calyx*-tube usually ovoid or cylindric, the limb entire or obscurely toothed. *Petals* usually 4 or 5, ovate oblong or obovate, acute, somewhat fleshy. *Stamens* twice as many as the petals, equal; anthers opening by a terminal pore; connective with 2 tubercles in front at the base and a spur behind. *Ovary* inferior, 4-6-celled, with many ovules on axile placentas; style filiform. *Fruit* a berry, crowned by the limb of the calyx. *Seeds* numerous, ovoid or subfalcate, the raphe often thickened.

Leaves 3-5-ribbed, elliptic lanceolate, 3-3·5 in. long, 1·5 in. broad, usually acute at both ends, thinly fleshy; flowers axillary, fascicled, peduncles 1-3-flowered; stamens with very short anthers, the tubercles and spur very small1. *malabarica*.

Leaves 3-ribbed, the outer ribs obscure and close to the margin, orbicular, 1·5 in. in diam., very fleshy; flowers axillary on solitary peduncles; stamens with long, curved, acuminate anthers, the tubercles and spur prominent.....2. *Beddomei*.

1. *MEDINILLA MALABARICA*, Bedd. Ic. t. 157; F. B. I. ii. 548.

W. Gháts, in the Nilgiris and Anamalais, at 3,000-7,000 ft. (Beddome).

An epiphytic subscandent shrub, the flowers and their peduncles, the petioles and the bases of the leaves all of a brilliant crimson colour.

2. *MEDINILLA BEDDOMEI*, C. B. Clarke in F. B. I. ii. 548.

M. radicans, Bedd. Ic. t. 184, not of Blume. *Triplectrum radicans*, W. & A. 324.

W. Gháts, from Coorg to Wynaad and perhaps further south, at 2,000-3,500 ft.

An epiphytic fleshy shrub, rooting from the joints of the stems.

5. Sonerila, Roxb.

Herbs, sometimes shrubby below, sometimes stemless, often fleshy. *Leaves* opposite, the pairs equal or unequal, entire or serrulate, ribbed or nerved from near the base or penninerved. *Flowers* mostly purple reddish or white, in scorpioid cymes. *Calyx*-tube funnel-shaped campanulate or hemispheric; teeth 3, short. *Petals* 3. *Stamens* 3, rarely 6, equal, anthers oblong or lanceolate, connective without appendage. *Ovary* inferior, 3-celled, many-ovuled, the placentas axile; style simple, filiform; stigma small or capitellate. *Fruit* a capsule, enclosed in the persistent calyx-tube, dehiscing apically by 3 valves. *Seeds* very many, minute, smooth or tuberculate, the raphe forming a lateral appendage.

Stems erect, elongate:—

Leaves membranous:—

Small soft herb with very small flowers and small truncate anthers; stems glandular-pilose, often winged; leaves ovate, under 1 in. long, with a pair of slender nerves from above the base1. *tenera*.

Erect suffrutescent herbs with rather large flowers and acuminate or rostrate anthers:—

Leaves with one slender pair of nerves from the base, a stronger pair a short way up covered with scattered bristly hairs, oblong-lanceolate, subentire, 1-1.5 in. long; fruiting capsule smooth, ribbed.....2. *Clarkei*.

Leaves with 2-3 pairs of nerves from the base and a pair or more of nerves a short way up, all ascending almost to the apex and joining in loops:—

Leaves glabrous or nearly so, minutely serrate on the margins:—

Leaves under 2.5 in. long, acuminate at apex, rounded at base, the petiole up to 1.25 in. long; fruiting capsule glabrous3. *Brunonis*.

Leaves 3-4 in. long, acuminate at apex, cordate at base, the petiole about 2 in. long; fruiting capsule glandular, hairy4. *elegans*.

Leaves with ferruginous silky hairs on both surfaces, acute at apex, narrowed at base, the margins ciliate, 1-3 in. long, the petiole about 1 in.; fruiting capsule with few glandular hairs.....5. *travancorica*.

Leaves penninerved with 8-10 nerves on either side of midrib, ovate-lanceolate, long-acuminate, the base subcordate, unequal, 3-4 in. long, sharply serrate; fruiting capsule glabrous

6. *versicolor*.

Leaves, also stems, thick and fleshy :—

Calyx-tube and lobes glandular-pilose; leaves ovate, acute at apex, rounded or cordate at base, 7-9-ribbed from the top of the usually long petiole, up to 3 in. long by 1.5 in. broad, sharply bristly-serrate, sparsely glandular-pilose or glabrous...7. *speciosa*.

Calyx-tube glabrous, smooth, in fruit funnel-shaped from a thick pedicel; leaves lanceolate, acute at apex, narrowed and shortly auricled at base, conspicuously 3-ribbed from the top of the short petiole, up to 1.5 in. long, .6 in. broad, sharply serrate, glabrous

8. *grandiflora*.

Stems creeping; calyx-tube in fruit campanulate from a slender pedicel; leaves ovate, acute at apex, rounded at base, slenderly 3-5-ribbed from the top of the petiole, up to 1.75 in. long, 1 in. broad, sharply bristly-serrate, glabrous.....9. *pulneyensis*.

Stemless or with only short weak stems; capsule hemispheric, with a rim :—

Stems up to 6 in. long, quadrangular, sometimes hardly any; leaves penninerved, ovate-lanceolate, acute, rounded or cordate often unequally, at base, up to 4 in. long by 1.5 in. broad, sparsely bristly; peduncles up to 3 in. long with 4-8 flowers.....10. *Rheedii*.

Stemless :—

Leaves ovate or ovate-lanceolate, usually cordate at base; peduncles more than 4-flowered :—

Slightly crispate-hairy; leaves with 3-4 pairs of nerves from the base, 2-3 on each side further up, up to 5 in. long, 3 in. broad, acuminate, minutely serrate; petals narrow; capsule .1 in. long.....11. *Wallichii*.

Glabrous; leaves with 2 pairs of nerves from the base, 1 pair further up, up to 2 in. long, 1 in. broad, acute, crenate-serrate; petals broad; capsule .15 in. long12. *scapigera*.

Leaves orbicular, deeply cordate at base, 2-3 pairs of nerves from the base, others above, up to nearly 1 in. in diam., minutely serrate; peduncles less than 4-flowered; petals broad; capsule .1-1.5 in. long.....13. *rotundifolia*.

1. *SONERILA TENERA*, Royle Ill. t. 45, fig. 2; F. B. I. ii. 530.

N. Circars, in Ganjam (Gamble); W. Gháts, in Wynaad at 4,000 ft. on rocks, occasional south to Tinnevely.

A small weak herb with small pink flowers.

2. SONERILA CLARKEI, Cogn. *S. amabilis*, Bedd.; F. B. I. ii. 533.

W. Gháts, hills of Tinnevely, at 2,000 ft. (Beddome).

A small woody plant with mauve flowers.

3. SONERILA BRUNONIS, W. & A. 321; F. B. I. ii. 53; Wt. Ill. t. 94, Ic. t. 1059. *S. Arnottiana*, Thw. var. *tenella*, Bedd.; F. B. I. ii. 532.

W. Gháts, at Courtallum in Tinnevely (Wight), Anamalais, at 3,000 ft. (Beddome).

An erect woody plant with mauve-purple flowers (blue in Wt. Ill. t. 94).

4. SONERILA ELEGANS, Wt. Ic. t. 995-3; F. B. I. ii. 535.

W. Gháts, at Sispara in Nilgiris, at 6,000 ft.

A pretty erect herbaceous plant with rather thick stems and mauve flowers.

5. SONERILA TRAVANCORICA, Bedd. Ic. t. 156; F. B. I. ii. 534.

W. Gháts, Attraimalai Hills of Travancore at 3,500-5,000 ft. (Beddome).

A pretty perennial undershrub with mauve flowers and silky foliage.

6. SONERILA VERSICOLOR, Wt. Ic. t. 1057; F. B. I. ii. 535.

W. Gháts, in Nilgiri Hills, 3,000-6,000 ft.

An annual undershrub with rose-coloured flowers, one side of the petals darker than the other.

- Var. *axillaris*. *S. axillaris*, Wt. Ic. t. 1058.

W. Gháts, in W. Nilgiris and Wynaad, about 3,000 ft., distinguished by the racemes being axillary along the stem instead of terminal.

7. SONERILA SPECIOSA, Zenk. Pl. Ind. Coimb. t. 18; F. B. I. ii. 534; Wt. Ic. t. 995-2.

W. Gháts, from Mysore to Nilgiris, where common in ravines, and Travancore Hills, at 5,000-7,000 ft.

A very pretty fleshy species with mauve-pink flowers. *S. Bensonii*, Hook. f. in Bot. Mag. t. 6049; F. B. I. ii. 540, seems to be a 6-stamened form of this species.

8. SONERILA GRANDIFLORA, Wall.; F. B. I. ii. 535; W. & A. 322; Wt. Ic. t. 995, Spic. Nilg. t. 67.

W. Gháts, in the Nilgiri, Anamalai and Pulney Hills, usually along streams, at about 6,000 ft.

A very pretty fleshy undershrub with purple flowers, sometimes paler, the small leaves prominently ribbed.

9. *SONERILA PULNEYENSIS*, Gamble in Kew Bull. 1919, 226.

W. Gháts, in the Pambar Ravine, Pulneys (Bourne).

A straggling fleshy plant rooting from the stems, the flowers not known.

10. *SONERILA RHEEDII*, W. & A. 321.

W. Gháts, Coorg to Malabar and Wynaad, at about 3,000 ft., on wet rocks.

A small short-stemmed or stemless plant with violet flowers.

11. *SONERILA WALLICHII*, Benn. ; F. B. I. ii. 538.

W. Gháts, from Wynaad to the Anamalais, at 3,000 ft. and upwards.

A stemless plant with bright pink or mauve flowers.

12. *SONERILA SCAPIGERA*, Dalz. ; F. B. I. ii. 538.

W. Gháts, Bababudan Hills of Malabar (Law).

A stemless glabrous plant with mauve flowers in many-flowered racemes.

13. *SONERILA ROTUNDIFOLIA*, Bedd. ; F. B. I. ii. 538 ; Bedd. Ic. t. 169.

W. Gháts, Malabar Hills, Nilgiris and Anamalais, on rocks at 4,000–6,000 ft.

A small stemless plant with rather large mauve flowers in few-flowered racemes, the peduncles bright red.

6. *Memecylon*, Linn.

Shrubs or trees, glabrous. *Leaves* opposite, coriaceous, sessile or shortly petioled, nerves inconspicuous, joining a usually inconspicuous intramarginal nerve. *Flowers* usually axillary (in axils of same year's leaves) or lateral (in axils of fallen leaves on old wood), fascicled or in simple or paniced cymes or umbellules; bracteoles 2 or more, at or near the base of the pedicels. *Calyx*-tube above the ovary campanulate or saucer-shaped, limb truncate or shortly 4-lobed, often coloured, enclosing a frequently rayed disk. *Petals* 4, blue or white, rarely reddish. *Stamens* 8, equal; filaments long; anthers short, opening by slits, the connective thickened at the back, ending in a spur or horn. *Ovary* 1-celled; ovules 6–12, on a central placenta; style filiform, simple. *Fruit* a globose or ellipsoid berry, crowned by the calyx-limb, normally

1-seeded. *Seed* large, testa crustaceous, cotyledons convolute, foliaceous.

Leaves petioled, acute at base, not cordate, rarely rounded :—

Flowers sessile or very shortly pedicellate, in fascicles on axillary or lateral tubercles :—

Leaves lanceolate, acuminate ; flowers axillary :—

Leaves up to 10 in. long by 2·5 in. broad with prominent intramarginal nerves connected by about 10–16 prominent straight nerves with the midrib ; flower-fascicles about ·5 in. broad, pedicels very short with lanceolate bracteoles ; calyx-tube campanulate, disk rays prominent and raised.....1. *Heyneanum*.

Leaves up to 4 in. long by 1·25 in. broad, the 6–10 nerves and intramarginal nerve faint ; flower-fascicles ·2 in. broad, the few flowers sessile, bracteoles ovate ; calyx-tube campanulate, disk-rays very faint 2. *Lawsoni*.

Leaves elliptic-ovate, up to 3·5 in. long, 1·5 in. broad, shortly and obtusely acute to acuminate at apex, narrowed at base, dull and yellowish when dry, intramarginal nerve and about 6 branching nerves often visible ; peduncles very short, fascicled, axillary and lateral, flowers sessile in umbels, with ovate bracteoles and campanulate calyx-tube, disk rays not apparent3. *Talbotianum*.

Leaves elliptic or elliptic-obovate, under 2 in. long, 1 in. broad, nerves not visible, petiole very short ; flowers axillary or lateral :—

Leaves green when dry ; branchlets very slender, pale ; tubercle small, flowers very shortly pedicellate with small bracteoles ; calyx above the ovary saucer-shaped, disk rays obscure

4. *Lushingtonii*.

Leaves yellowish when dry ; branchlets slender, nodose, rough, ultimate often quadrangular ; tubercles small, flowers shortly pedicellate with lanceolate bracteoles ; calyx above the ovary campanulate, disk rays obscure 5. *flavescens*.

Flowers clearly pedicellate, in pedunculate cymes :—

Cymes branched, lateral, the ultimate branches umbellulate :—

Leaves linear-lanceolate up to 3 in. long by ·5 in. broad, obtuse at apex, intramarginal nerve close to the margin, the nerves ascending ; calyx above the ovary saucer-shaped, the disk clearly but not thickly rayed 6. *angustifolium*.

Leaves ovate or ovate-elliptic, under 2 in. long by ·75 in. broad, obtuse or emarginate at apex, dull above, yellowish when dry, nerves not visible ; calyx campanulate, the disk rays conspicuous, raised 7. *umbellatum*

Leaves ovate, acute or obtuse or emarginate at apex, acute or obtuse at base, shining above, up to 4 in. long by 1·5 in. broad, when dry the upper surface greenish, the lower brown, intramarginal nerve and about 8-10 pairs of nerves faintly visible; peduncles about ·25 in. long; calyx campanulate, the disk rays slightly raised.....8. *edule*.

Leaves ovate, acute or acuminate at apex, acute or obtuse at base, sometimes shining above, up to 7 in. long by 2 in. broad, nerves and intramarginal nerves slightly visible when dry; peduncles about ·5 in. long, pedicels filiform; calyx cup-shaped, the disk rays conspicuous.....9. *grande*.

Cymes branched, the ultimate branches not distinctly umbellate:—

Cymes axillary, 3-flowered, pedicels filiform with bracteoles above the base, peduncles ·25-·5 in. long; leaves ovate-lanceolate, caudate-acuminate, up to 2 in. long, ·7 in. broad; calyx cup-shaped, white, disk distinctly rayed.....10. *gracile*.

Cymes lateral, short, few-flowered:—

Leaves green when dry, ovate-lanceolate, caudate-acuminate, 2-3·5 in. long, ·75-1·5 in. broad, the intramarginal nerve and about 8 pairs of nerves visible but faint; cymes scarcely ·2 in. long.....11. *madgolense*.

Leaves yellow when dry, narrowly ovate-oblong, obtuse or emarginate, under 2 in. long, ·75 in. broad, intramarginal nerve and about 6-8 pairs of nerves faintly visible; cymes ·5 in. in diam.; calyx in fruit saucer-shaped, disk rays apparent; branchlets quadrangular.....12. *molestum*.

Leaves sessile or nearly so, cordate or sometimes rounded at base:—

Flowers fascicled, singly or in very short-peduncled cymes on lateral tubercles, or rarely axillary:—

Leaves shortly (·1 in.) -petioled, rounded or slightly cordate at base, ovate-oblong, obtuse at apex, up to 3·5 in. long by 1·5 in. broad, intramarginal nerves and about 10 nerves visible; pedicels ·2 in. long; calyx campanulate above the ovary, the teeth acute, disk rays faint.....13. *sisparens*.

Leaves sessile, cordate at base, ovate, obtusely acute, up to 2·5 in. long by 1·5 in. broad; pedicels ·15 in. long; calyx campanulate above the ovary, the teeth acute, disk rays faint

14. *malabaricum*.

Leaves sessile or very shortly (scarcely ·1 in.) -petioled, cordate, oblong-lanceolate, acuminate, up to 6 in. long by 1·5 in. broad;

pedicels '1 in. long; calyx above the ovary saucer-shaped, papillose without, the disk rays faint; flowers lateral or axillary

15. *deccanense*.

Flowers fascicled on axillary or lateral small tubercles:—

Flower-clusters very small, few-flowered; branchlets quadrangular; leaves ovate, obtuse, up to 2 in. long, 1 in. broad, cordate, sessile; calyx funnel-shaped, slightly papillose, the disk rays faint.....16. *subcordatum*.

Flower-clusters about '5 in. in diam., usually axillary; branchlets terete; leaves sessile, cordate, lanceolate, 3-6 in. long, 1-2 in. broad; calyx-tube above the ovary suddenly widened to saucer-shape, disk rays prominent.....17. *depressum*.

Flowers in long ('5-7 in.) -peduncled, subterminal or axillary umbels; leaves lanceolate, acuminate, 1'5-2'5 in. long, '7-1 in. broad; pedicels '2 in. long; calyx-tube cup-shaped, lobes acute; disk rays fairly prominent 18. *terminale*.

1. MEMECYLON HEYNEANUM, Benth.; F. B. I. ii. 560; W. & A. 319. *M. jambosoides*, Wt. Ic. t. 277.

W. Gháts, in Wynaad, the Bolumpatti Valley and Tinnevely Hills up to 3,000 ft.

A shrub with prominently nerved leaves and blue flowers.

2. MEMECYLON LAWSONI, Gamble in Kew Bull. 1919, 226.

W. Gháts, in S.E. Wynaad at about 3,000 ft. (Lawson).

3. MEMECYLON TALBOTIANUM, Brandis in Talb. Bomb. List, ed. 2, appendix.

W. Gháts, Coorg or Nilgiris (G. Thomson); W. Coast, in S. Canara (Hohenacker).

A tree reaching 30-40 ft. in height with blue flowers and yellow globose berry '25 in. in diam.

4. MEMECYLON LUSHINGTONII, Gamble in Kew Bull. 1919, 227.

Deccan, Horsleykonda in Cuddapah at 4,000 ft. (Gamble), Osahatti in Coimbatore (A. W. Lushington); W. Gháts, in E. Nilgiris at 4,000-6,000 ft.

A large shrub with small leaves, pale blue flowers in small clusters and berry '2 in. in diam.

5. MEMECYLON FLAVESCENS, Gamble in Kew Bull. 1919, 226.

W. Gháts, in Nilgiri Sholas at and above 7,000 ft. (Gamble).

A large shrub with many branches, usually obovate yellowish leaves, pale blue flowers and greyish berry '3 in. in diam.

6. *MEMECYLON ANGUSTIFOLIUM*, Wt.; F. B. I. ii. 562; Wt. Ic. t. 276.
W. Gháts, in forests near Courtallum in Tinnevely (Wight), usually on river banks.
A shrub reaching 6-8 ft. in height with purplish-blue flowers and black-purple berries.
7. *MEMECYLON UMBELLATUM*, Burm. f. *M. ramiflorum*, Lamk.; W. & A. 319. *M. tinctorium*, Koen.; W. & A. 319; Wt. Ill. t. 93. *M. edule* var. *ramiflora*, C. B. Clarke in F. B. I. ii. 563.
E. Coast Districts from the Kistna southwards; Deccan, from Cuddapah and N. Arcot to Coimbatore, in forests on the slopes; W. Coast, in Travancore.
A large shrub with yellowish foliage and small yellow berries, the flowers blue.
8. *MEMECYLON EDULE*, Roxb. Cor. Pl. t. 82; F. B. I. ii. 563 *in part only*.
N. Circars, in Ganjam, up to 4,500 ft. on Mahendragiri; Deccan, hills of N. Arcot and Cuddapah, common in dry evergreen forests.
A large shrub with blue flowers and black-purple, edible, fleshy berry '25 in. in diam., the leaves shining on the upper surface. Bark light brown, rough; wood light brown, very hard and close-grained, a good fuel. Vern. *Ur*. Nirása; *Tel*. Alli; *Tam*. Kaya.
9. *MEMECYLON GRANDE*, Retz; F. B. I. ii. 557; W. & A. 320. *M. edule* var. *ovata*, C. B. Clarke in F. B. I. ii. 564.
W. Coast Districts from S. Canara to Travancore; W. Gháts, in the lower Pulney Hills.
A large shrub with rather long-peduncled cymes, largish leaves and brownish-black berry '25 in. in diam.
10. *MEMECYLON GRACILE*, Bedd. Ic. t. 164; F. B. I. ii. 555.
W. Gháts, evergreen forests of Travancore and Tinnevely at 1,000-3,000 ft., a common undershrub.
A pretty shrub with zig-zag branches, pale blue flowers and globose berry '25 in. in diam. The wood makes good walking-sticks.
11. *MEMECYLON MADGOLENSE*, Gamble in Kew Bull. 1919, 227.
N. Circars, Madgol Hills of Vizagapatam at 3,000-4,500 ft. (A. W. Lushington).
A shrub, the berries about '15 in. in diam.

12. MEMECYLON MOLESTUM, Cogn. *M. edule* var. *molesta*, C. B. Clarke in F. B. I. ii. 564.
W. Gháts, in the Nilgiri and Anamalai Hills at about 6,000 ft.
A tree reaching 30–40 ft. in height, with bright blue conspicuous flowers, the berries .2 in. in diam.
13. MEMECYLON SISPARENSE, Gamble in Kew Bull. 1919, 227.
W. Gháts, on Sispara Ghát in W. Nilgiris, at 5,000 ft. (Gamble).
A large shrub or small tree with flower clusters about 1 in. in diam., the petals blue, calyx red.
14. MEMECYLON MALABARICUM, Cogn. *M. amplexicaule* var. *malabarica*, C. B. Clarke in F. B. I. ii. 559 in part.
W. Gháts, in moist sholas of the Nilgiri and Pulney Hills at 4,000–6,000 ft.
A small tree with bright blue flowers in clusters about .5 in. in diam., the calyx red. Wood greyish-brown, very hard and close-grained, a good fuel.
15. MEMECYLON DECCANENSE, C. B. Clarke in F. B. I. ii. 560. *M. Heynemannum*, W. & A. 319, not of Benth.
W. Coast, in Malabar and Travancore at low levels.
A shrub, apparently scarce, the flowers blue with red calyx, the berries black, .15 in. in diam., the flowers sometimes axillary.
16. MEMECYLON SUBCORDATUM, Cogn. *M. amplexicaule* var. *cordata*, Wight; F. B. I. ii. 559.
S. India, precise locality not known.
17. MEMECYLON DEPRESSUM, Benth. *M. amplexicaule* var. *malabarica*, C. B. Clarke in F. B. I. ii. 559 in part.
W. Coast and lower slopes of W. Gháts in Malabar and Travancore, up to 1,200 ft.
A shrub, rather variable in leaves, the branchlets sometimes terete, sometimes tetragonous; berries black, .3 in. in diam.
18. MEMECYLON TERMINALE, Dalz.; F. B. I. ii. 558. *M. amabile*, Bedd. Ic. t. 163; F. B. I. ii. 555.
W. Gháts, in the hills of S. Canara up to 2,000 ft. (Beddome).
A slender, pretty shrub reaching about 10 ft. in height, with pale blue flowers.

Family LXVI. LYTHRACEAE.

Trees, shrubs or herbs. *Leaves* usually decussate, rarely alternate or verticillate, entire; stipules 0 or minute, generally deciduous. *Flowers* hermaphrodite, regular or sometimes zygomorphic, solitary or in axillary dichasia, sometimes paniculate; bracts and bracteoles small, usually deciduous. *Calyx*-tube persistent, cup-shaped campanulate or tubular; lobes 3-6, valvate, often with accessory appendages alternating with them. *Petals* as many as the calyx-lobes, alternate with them, inserted on the mouth of the tube, sometimes 0, frequently clawed and wrinkled. *Stamens* as many as, or twice as many as, the calyx-lobes or very many, inserted on the calyx-tube. *Ovary* free, in the bottom of the calyx-tube, 1-6-celled; the ovules on axile placentas; style long; stigma capitate. *Fruit* a dehiscent or indehiscent capsule opening by valves or irregularly, usually many-seeded. *Seeds* various in shape, sometimes winged; cotyledons flat or convolute.

Low, usually aquatic herbs with very small flowers; calyx membranous :—

Placenta in the ovary not continuous with the style :—

Fruit dehiscent, opening in valves, the valves minutely horizontally striate 1. *Rotala*.

Fruit indehiscent, opening irregularly, the walls not striate

2. *Ammannia*.

Placenta in the ovary continuous with the style, the fruit operculately or irregularly dehiscent.....3. *Nesaea*.

Trees or shrubs; calyx moderately thick :—

Flowers zygomorphic; calyx-tube tubular, curved; shrub with under surface of leaves black-dotted.....4. *Woodfordia*.

Flowers actinomorphic; calyx-tube not curved :—

Capsule circumsciss; flowers 6-merous, solitary in the leaf-axils; fleshy.....5. *Pemphis*.

Capsule 3-6-valved; flowers 6-merous; stamens many; seeds winged.....6. *Lagerstroemia*.

Capsule irregularly dehiscent; flowers 4-merous; stamens 8; seeds pyramidal.....7. *Lawsonia*.

1. *Rotala*, Linn.

Annual or rarely perennial herbs of wet places, stems often tetragonous. *Leaves* verticillate, opposite and decussate or rarely

alternate, entire, sessile or subsessile; stipules 0. *Flowers* very small, solitary and axillary or in terminal spikes or racemes, rarely in umbels, usually sessile; bracteoles 2. *Calyx*-tube campanulate or subglobose, often scarious and hyaline; lobes 3-6 with often subulate appendages between them. *Petals* as many as calyx-lobes, inserted between them, usually small, sometimes absent. *Stamens* 1-6, on the calyx-tube opposite the lobes. *Ovary* sessile or substipitate, 2-4-celled; ovules many; style columnar; stigma capitate. *Fruit* a septicidal 2-4-valved capsule, the walls minutely horizontally striate; placenta central, free at the top, one valve of the capsule crowned with the style. *Seeds* minute, ellipsoid or hemispheric, usually flattened on one side.

Flowers and leaves verticillate:—

Petals 0; stamens fewer than the 5 calyx-lobes; bracteoles much longer than the calyx; capsule 2-3-valved.....1. *occultiflora*.

Petals present; calyx-lobes and stamens 3 each; bracteoles much shorter than the calyx; capsule 3-valved.....2. *verticillaris*.

Flowers and leaves opposite, decussate:—

Flowers axillary or in numerous leafy spikes:—

Calyx appendiculate, the appendices subulate, sometimes absent:—

Petals minute, subulate, calyx-lobes long-acuminate; capsule 4-valved; very small almost filiform herbs3. *illecebroides*.

Petals obovate; calyx-lobes acute; capsule 3-valved; herbs with tetragonous stems:—

Calyx-lobes very short; petals very small; floral leaves not conspicuously smaller than those of the stem

4. *leptopetala*.

Calyx-lobes triangular, acute; petals rather large; floral leaves usually much smaller than the others.....5. *densiflora*.

Calyx exappendiculate:—

Stamens longer than the calyx, the calyx-lobes triangular, acute; petals 5, fimbriate; capsule 3-valved.....6. *fimbriata*.

Stamens shorter than the calyx, the calyx-lobes acuminate; petals 4, obovate, entire; capsule 2-valved.....7. *indica*.

Flowers in close terminal spikes, with cordate floral leaves; petals 4, rose; capsule 4-valved:—

Petals large, broadly obovate; stamens included; leaves rounded or suborbicular, shortly petioled8. *rotundifolia*.

Petals small, narrowly obovate; stamens exerted; leaves orbicular, sessile.....9. *macrandra*.

1. *ROTALA OCCULTIFLORA*, Koehne.

W. Coast, in Malabar (G. Thomson, quoted by Koehne).

A small water-herb with linear verticillate leaves and long bracteoles.

2. *ROTALA VERTICILLARIS*, Linn.; W. & A. 303; Wt. Ic. t. 260 A. *Ammannia Rotala*, C. B. Clarke in F. B. I. ii. 567.

E. Coast, from Nellore (Bourne) southwards to Tranquebar (Rottler).

A small herb of ricefields with verticillate linear leaves.

3. *ROTALA ILLECEBROIDES*, Koehne. *Ammannia pentandra* var. *illecebroides*, C. B. Clarke in F. B. I. ii. 569.

W. Gháts, in the Anamalai Hills, at 3,500 ft. (Fischer); no locality (Wight).

A very slender water-herb with erect slender stems, the leaves ovate-cordate, the calyx-lobes with conspicuous hair-like acumination.

4. *ROTALA LEPTOPETALA*, Koehne. *Ammannia pentandra*, Roxb.; F. B. I. ii. 568 in part.

Plains Districts, chiefly on the East Coast, in moist places.

A herb 3 to 12 in. high with usually erect stems and rather few branches, hardly distinct from *R. densiflora*.

5. *ROTALA DENSIFLORA*, Koehne. *R. Roxburghiana*, Wt. Ic. t. 260 B. *Ammannia pentandra*, Roxb.; F. B. I. ii. 568 in part.

Most plains Districts, in moist places.

A herb reaching 6-12 in. high with many divaricating floriferous branches.

6. *ROTALA FIMBRIATA*, Wt. Ic. t. 217. *Ammannia pentandra* var. *fimbriata*, C. B. Clarke in F. B. I. ii. 569.

Deccan, in Mysore, in ricefields and on tank borders (Wight), Horsleykonda, in Cuddapah, at 4,000 ft. (Gamble, Fischer).

A rather large herb reaching nearly 2 ft. in height, the lower nodes rooting, the leaves linear cordate.

7. *ROTALA INDICA*, Koehne. *Ammannia peploides*, Spr.; F. B. I. ii. 566. *Ameletia indica*, DC.; W. & A. 303; Wt. Ic. t. 257 A.

Most Districts in ricefields and other wet places, in the hills up to 2,000 ft.

An extensively rooting much-branched herb, the obovate

spathulate thickly marginate stem leaves much larger than the slender floral ones which make short leafy spikes.

8. *ROOTAL ROTUNDIFOLIA*, Koehne. *Ammannia rotundifolia*, Roxb.; F. B. I. ii. 566; W. & A. 306 *in part*.

All Districts, in ricefields and other wet places, up to 7,000 ft. in the hills.

An extensively creeping herb forming large patches, conspicuous for its terminal spikes of pretty rose-coloured flowers.

9. *ROOTAL MACRANDRA*, Koehne. *Ammannia rotundifolia*, W. & A. 306 *in part*. *Ameletia rotundifolia*, Wt. Ic. t. 258.

W. Gháts, in the hills of Malabar (Bourne), Anamalais (Wight).

A flaccid herb, creeping and rooting at base, much branched, scarcely distinct from *R. rotundifolia*.

2. *Ammannia*, Linn.

Annual (or perhaps biennial sometimes) glabrous herbs of wet places, stems more or less tetraginous. *Leaves* decussate, sessile, often cordate at base; stipules 0. *Flowers* small, 4- or rarely 5-merous, in axillary sessile or pedunculate dichasia; bracteoles pale, membranous. *Calyx*-tube campanulate, later globose; lobes 4, triangular; appendages 0 or very short. *Petals* alternate, when present, between the calyx-lobes, sometimes 0. *Stamens* 4 or 8, on the calyx-tube. *Ovary* sessile, incompletely 1-5-celled; style erect; stigma capitate. *Fruit* a capsule, breaking up irregularly or circumsciss, the walls very thin, membranous, not striate. *Seeds* very many, small, a raphe on the inner face.

Style filiform; leaves usually auriculate-cordate; petals present:—

Capsule as long as or longer than the calyx-tube; flowers pedicellate; stamens 4, included; petals small or absent..... 1. *multiflora*.

Capsule hidden in the calyx-tube; flowers subsessile; stamens 8, long exserted; petals 1 in. long..... 2. *octandra*.

Style thick; leaves narrowed or somewhat cordate at base; petals 0; capsules lightly longer than the calyx-tube; stamens 4... 3. *baccifera*.

1. *AMMANNIA MULTIFLORA*, Roxb.; F. B. I. ii. 570; W. & A. 305.

All plains Districts, in wet places.

A small erect herb with narrow leaves.

2. *AMMANNIA OCTANDRA*, Linn. f.; F. B. I. ii. 571; Roxb. Cor. Pl. t. 133; W. & A. 304.

East Coast, on tank borders.

A rather large erect herb with large rose-coloured petals.

3. *AMMANNIA BACCIFERA*, Linn.; F. B. I. ii. 569. *A. vesicatoria*, Roxb.; W. & A. 305.

All plains Districts, in wet places.

An erect herb reaching sometimes 2 ft. in height, the leaves narrowed at the base.

- Var. *aegyptiaca*, Koehne. *A. salicifolia*, C. B. Clarke in F. B. I. ii. 569. Leaves more or less cordate at base, the flowers and capsule larger.

Most Districts of the Circars and Deccan, and up to 5,000 ft. in the Nilgiri Hills.

• 3. *Nesaea*, Comm.

Annual or perennial herbs or undershrubs, stems often tetragonous. *Leaves* decussate or verticillate, sessile or shortly petioled; stipules 0. *Flowers* small, solitary and axillary, or in axillary dichasia; bracteoles 2. *Calyx*-tube campanulate urceolate or globose, herbaceous, lobes 4-8, appendices usually short or 0. *Petals* as many as the calyx-lobes, inserted between them, sometimes absent. *Stamens* 4-many, inserted on the calyx-tube. *Ovary* sessile, glabrous, 2-5-celled; ovules many; style 0 or short; stigma capitate. *Fruit* a globose or ellipsoid capsule, at first opening with an operculum, later irregularly below; placenta central, running up to the style, the valves remaining as wings. *Seeds* minute, flattened or hollowed on one side.

Leaves attenuate at base; calyx-tube usually pubescent, appendages horn-like, prominent.....1. *lanceolata*.

Leaves cordate and subamplexicaul at base; calyx-tube glabrous, appendages short 2. *brevipes*.

1. *NESAEA LANCEOLATA*, Koehne. *Ammannia lanceolata*, Heyne; F. B. I. ii. 570.

Circars, Deccan and Carnatic, in wet places, near the Coast.

2. *NESAEA BREVIPES*, Koehne. *Ammannia cordata*, W. & A. 304; F. B. I. ii. 570.

Circars and Deccan.

4. *Woodfordia*, Salisb.

Shrubs, often arborescent, the branches terete or the younger tetragonous. *Leaves* opposite, entire, subcoriaceous, with black glandular dots on the under surface. *Flowers* in short axillary racemes, rarely solitary; bracteoles 2. *Calyx*-tube long, slightly curved, contracted above, oblique near the mouth; lobes 6, short, with short accessory appendages. *Petals* 6, very small. *Stamens* 12, inserted near the bottom of the calyx-tube, usually much exserted, the alternate ones longer; filaments filiform. *Ovary* sessile, 2-celled; ovules very many on axile placentas; style long, filiform; stigma minute. *Fruit* an ellipsoid, membranous capsule included in the calyx, the tube of which is sometimes split by it. *Seeds* many, cuneate, smooth.

WOODFORDIA FRUTICOSA, Kurz. *W. floribunda*, Salisb.; F. B. I. ii. 572. *Grislea tomentosa*, Roxb. Cor. Pl. t. 31; W. & A. 308.

N. Circars and Deccan, as far south as the hills of Kurnool, in deciduous forests, on dry hill sides and rocky places; W. Coast, in S. Canara (Wight).

A large deciduous shrub with scarlet flowers and lanceolate caudate leaves, whitish beneath. Bark thin, grey; wood reddish-white and hard. The flowers give a red dye. Vern. *Hind.* Dawi; *Ur.* Jatiko; *Tel.* Jargi, Seringi.

5. *Pemphis*, Forst.

Shrubs or small trees. *Leaves* opposite, thick and fleshy, entire. *Flowers* solitary, axillary, pedunculate; bracteoles 2. *Calyx*-tube campanulate, coriaceous, ribbed; lobes 6, short, with 6 shorter appendages. *Petals* 6, inserted at the top of the calyx-tube, wrinkled. *Stamens* 12 (or 18), inserted in 2-rows on the calyx-tube. *Ovary* free, subsessile, 3-celled at the base; ovules many; style long; stigma capitate. *Fruit* a coriaceous capsule, nearly globose, circumsciss. *Seeds* numerous, compressed-angular, cuneate, margined.

PEMPHIS ACIDULA, Forst.; F. B. I. ii. 573; W. & A. 307. *Maclellandia Griffithiana*, Wt. Ic. t. 1996.

Sea coast and tidal backwaters in Malabar, Travancore and Tinnevely.

A large branching evergreen shrub or small tree with grey-

silky pubescent small leaves under 1·5 in. long and pink flowers.

6. *Lagerstroemia*, Linn.

Trees or shrubs. *Leaves*, opposite, distichous or the uppermost alternate, entire, petiolate, often glaucous beneath; stipules 2, deciduous. *Flowers* often large and showy, in axillary racemes often forming terminal usually trichotomous panicles; bracts 2, at the apex of the peduncles; bracteoles 2, on the pedicels. *Calyx*-tube campanulate, coriaceous, smooth or ribbed; lobes 6, valvate. *Petals* 6, sometimes more, inserted on the top of the calyx-tube, clawed, the blade wrinkled, the margins crispate. *Stamens* numerous, inserted near the base of the calyx-tube; filaments long, exserted. *Ovary* sessile, 3-6-celled; ovules many, ascending, on axile placentas; style long, curved; stigma capitate. *Fruit* an ellipsoid woody loculicidal capsule, 3-6-valved. *Seeds* numerous, flat, erect, falcately winged at the apex, testa hard; cotyledons orbicular, thin, convolute,

Ovary glabrous:—

Calyx-tube smooth without:—

Petals white, rather small, shortly clawed:—

Calyx-tube with a ring inside the lobes appressed to the capsule in fruit; leaves greyish and glabrous or shortly pubescent beneath, rounded at base1. *parviflora*.

Calyx-tube without a ring; leaves narrowed at base:—

Leaves glabrous or downy and bluish-white beneath up to 4 in. long; flowers scarcely ·25 in. broad; calyx lobes reflexed in fruit..... 2. *lanceolata*.

Leaves ferruginous-villous beneath, up to 6 in. long; flowers more than ·25 in. broad.....3. *Thomsonii*.

Petals variously coloured from white to crimson; leaves green beneath.....*indica*.

Calyx-tube ribbed without; petals large, mauve; leaves large, up to 8 in. long, green beneath.....4. *Flos-Reginae*.

Ovary densely villous; calyx-tube not ribbed, densely fulvous tomentose as is the under surface of the leaves.....5. *Rottleri*.

1. *LAGERSTROEMIA PARVIFLORA*, Roxb. Cor. Pl. t. 66; F. B. I. ii. 575; W. & A. 308; Wt. Ic. t. 69; Bedd. Fl. t. 31.

N. Circars and Deccan as far south as the N. Nilgiris, in deciduous forest.

A large deciduous tree with rather small white flowers and a woody capsule varying in size. Bark light brown, thin, exfoliating in long scales; wood hard, useful for building and agricultural purposes. Vern. *Hind.* Sida, Bakli; *Ur.* Sidha; *Tel.* Chinangi.

2. *LAGERSTROEMIA LANCEOLATA*, Wall.; F. B. I. ii. 576; W. & A. 309. *L. microcarpa*, Wt. Ic. t. 109; Bedd. Fl. t. 30. Deccan, in the Sandúr Hills of Bellary, up to 4,000 ft. (A. W. Lushington); W. Gháts and W. Coast, common in deciduous and dry evergreen forests up to 3,000 ft.

A large deciduous tree with small white flowers and small capsules. Bark smooth, white, peeling off in papery flakes; wood reddish-brown, moderately hard, useful and valuable for building and other purposes. Vern. *Tel.* Ventaku; *Tam.* Vevala; *Mal.* Venthekku; *Kan.* Billi nandi.

3. *LAGERSTROEMIA THOMSONII*, Koehne in Engl. Pflzreich xvii. 257.

"Mysore and Carnatic" (G. Thomson), probably W. Gháts, apparently very rare.

4. *LAGERSTROEMIA FLOS-REGINAE*, Retz; F. B. I. ii. 577. *L. Reginae*, Roxb. Cor. Pl. t. 65; W. & A. 308; Wt. Ic. t. 413; Bedd. Fl. t. 29.

W. Gháts, from S. Canara through Malabar to Travancore, chiefly along river banks and up to 3,000 ft.; hills of the N. Circars (Roxburgh); much cultivated for ornament, sometimes for timber.

A large deciduous tree, very handsome from its large mauve flowers, the seed capsules remaining long. Bark smooth, usually grey; wood light red, hard, valuable for building, for ship work and furniture. Vern. *Hind.* Jarúl; *Tam.* Kadali, Pu maruthu; *Mal.* Mani maruthu.

5. *LAGERSTROEMIA ROTTLEI*, C. B. Clarke in F. B. I. ii. 576. Without locality (Rottler).

A well-marked but very little-known tree.

Lagerstroemia indica, Linn., is an ornamental large shrub or small tree, commonly cultivated in gardens, native of China.

7. *Lawsonia*, Linn.

A glabrous shrub, branches terete, branchlets sometimes tetragonous, ending in spines. Leaves opposite, entire, lanceolate;

stipules minute, deciduous. *Flowers* small, in terminal panicles; bracts small, deciduous. *Calyx*-tube short; lobes 4, spreading, ovate. *Petals* 4, obovate, wrinkled and crenate, inserted on the top of the calyx-tube. *Stamens* 8, inserted in pairs at the base of the calyx-tube and opposite the lobes; anthers oblong, the connective thick. *Ovary* subglobose, 2-4-celled; ovules many, on axile placentas; style long, thick; stigma capitate. *Fruit* a globose capsule, breaking up irregularly, ultimately 1-celled. *Seeds* numerous, pyramidal, closely packed; testa spongy; cotyledons orbicular, flat.

LAWSONIA INERMIS, Linn. *L. alba*, Lamk.; F. B. I. ii. 573; W. & A. 307; Wt. Ill. t. 87.

All plains Districts, cultivated as a hedge plant, perhaps wild on the Coromandel coast and in the Deccan. The Henna plant.

A deciduous shrub with white flowers and small leaves which give the "henna" dye. Bark greyish-brown, thin; wood grey, hard. Vern. *Hind.* Mehndi; *Ur.* Manghati; *Tel.* Gorinta; *Tam.* Marithondi; *Kan.* Gorantu.

Family LXVII. SONNERATIACEAE.

Trees or shrubs, glabrous. *Leaves* opposite, entire; stipules 0. *Flowers* regular, small or large, solitary or in panicles; bracts and bracteoles 0. *Calyx*-tube slightly united with the ovary; lobes 4-9, valvate. *Petals* as many as the calyx-lobes and alternate with them, sometimes 0. *Stamens* as many as the calyx-lobes and alternate with them or very many inserted within the rim of the calyx-tube; filaments bent inwards in bud. *Ovary* 2-20-celled, nearly superior; ovules numerous, in many rows; style long; stigma capitate or peltate. *Fruit* a dry or somewhat fleshy indehiscent or dehiscent capsule, many-seeded.

Sonneratia, Linn. f.

Glabrous sea-coast trees. *Leaves* opposite, petioled, coriaceous, entire. *Flowers* large, terminal, solitary or 2-3 together. *Calyx* thickly coriaceous; tube widely campanulate, lobes valvate. *Petals* 4-8 or 0. *Stamens* numerous, inserted on the circular rim of the calyx-tube, inflexed in bud. *Ovary* free or adnate at the base to the calyx-tube, many-celled; ovules many, ascending, on axile placentas; style long; stigma capitate. *Fruit* a subglobose,

10-15-celled, many-seeded berry, supported by the persistent calyx. *Seeds* small, curved, angular, embedded in pulp; cotyledons convolute; radicle short, terete.

Calyx-lobes 4; petals 0; stigma large, umbrella-shaped; leaves narrowly oblong 1. *apetala*.

Calyx-lobes 6; petals 6; stigma capitate; leaves obovate

2. *caseolaris*.

1. SONNERATIA APETALA, Buch.-Ham.; F. B. I. ii. 579; W. & A. 327.

E. Coast, in mangrove forests in the deltas of the Godavari, Kistna and Coleroon.

A moderate-sized evergreen tree with black smooth bark and reddish-brown wood. It gives, like the true mangroves (*Rhizophora*), upright root excrescences. Vern. Tel. Kyalanki; Tam. Marama.

2. SONNERATIA CASEOLARIS, Engl. *S. acida*, Linn. f.; F. B. I. ii. 579; W. & A. 327; Wt. Ic. t. 340.

W. Coast, along backwaters from S. Canara southwards.

A small evergreen tree with large showy pink-petalled flowers and large depressed-globose fruit. Wood grey, soft, even-grained. It also gives root-excrescences with even softer wood. Vern. Mal. Blatti, Thirala.

Family LXVIII. ONAGRACEAE.

Herbs, rarely undershrubs, sometimes aquatic. *Leaves* opposite or alternate, entire or toothed; in *Trapa* the submerged leaves pinnatifid; stipules 0. *Flowers* hermaphrodite, axillary and solitary or in terminal and axillary spikes or racemes, regular or sometimes irregular. *Calyx*-tube wholly adnate to the ovary (half-adnate in *Trapa*); lobes 2-5, valvate. *Petals* epigynous, alternate with the calyx-lobes, rarely 0. *Stamens* as many as or twice as many as the petals and inserted with them. *Ovary* inferior (half-inferior in *Trapa*), 1-6-, usually 4-celled, ovules 1 or many in each cell, pendulous or half-ascending, placentas axile; style subulate; stigma capitate or 2-4-lobed. *Fruit* various, dehiscent or indehiscent, capsular or baccate, 1- or many-celled and -seeded. *Seeds* usually small; albumen 0 or a very thin layer.

Fruit a many-seeded capsule; leaves alternate:—

Stamens twice as many as the calyx-lobes; ovary 4-celled:—

Calyx scarcely produced beyond the ovary; capsule septicidal

1. *Jussieua*.

Calyx usually much produced beyond the ovary; capsule loculicidal..... *Oenothera*.

Stamens as many as the calyx-lobes; ovary 3-6-celled

2. *Ludwigia*.

Fruit indehiscent, 1-4-celled, 1-4-seeded:—

Flowers 2-merous; ovary 1-2-celled, the ovules attached to the axis; small erect land herbs with small fruits having hooked hairs..... 3. *Circaea*.

Flowers 4-merous; ovary 2-celled, the ovules attached to the septum; floating water herbs with large fruits with 2-4 spines

4. *Trapa*.

1. *Jussieua*, Linn.

Herbs or undershrubs, usually of wet places. *Leaves* alternate, usually entire. *Flowers* yellow or white, axillary, solitary; pedicels with 2 bracteoles. *Calyx*-tube narrow, scarcely produced above the ovary; lobes 4-6, acute, persistent. *Petals* 4-6, on the margin of an epigynous disk. *Stamens* twice as many as the petals and inserted with them. *Ovary* inferior, 4-5-celled; ovules many, axile, in several vertical rows at the inner angle of each cell; style simple, short; stigma 4-5-lobed. *Fruit* a linear, terete or angled, 4-5-celled capsule, septicidally 4-5-valved, crowned by the disk and calyx-lobes. *Seeds* numerous, small, the crustaceous testa including an empty cell forming the raphe, the embryo in a membranous inner coat; cotyledons oblong, obtuse.

Water-plants with floating or creeping stems; petals 5, white; leaves obovate or oblanceolate, obtuse; seeds with a narrow raphe...1. *repens*

Erect plants of wet places; petals 4, yellow; leaves lanceolate, acute; seeds with a prominent raphe, appearing didymous in one variety.....2. *suffruticosa*.

1. *JUSSIEUA REPENS*, Linn.; F. B. I. ii. 587; W. & A. 336.

E. and W. Coast Districts, in or on the borders of ponds and tanks and watercourses.

A pretty water-plant, floating by means of white cellular floats at the nodes of the main stem.

2. *JUSSIEUA SUFFRUTICOSA*, Linn.; F. B. I. ii. 587. *J. villosa*, Lamk.; W. & A. 336.

W. Coast and W. Gháts, in wet places up to 3,000 ft.

An erect hairy undershrub, reaching 4-6 ft. high, with large flowers.

2. *Ludwigia*, Linn.

Herbs. *Leaves* alternate, petiolate, narrowly lanceolate, entire. *Flowers* yellow, usually axillary, solitary, sessile or nearly so; pedicels with 2 bracteoles. *Calyx*-tube scarcely produced above the ovary; lobes 3-5, acute, persistent or late deciduous. *Petals* 3-5, inserted below the margin of an epigynous disk. *Stamens* as many as the petals and inserted with them; filaments short. *Ovary* inferior, 4-5-celled; ovules many, axile, attached in 2 or more vertical rows to the inner angle of each cell; style simple; stigma capitate. *Fruit* a linear or oblong 4-5-celled capsule, opening by terminal pores or breaking up irregularly along the sides. *Seeds* very many, small, smooth, with a narrow raphe; cotyledons rounded.

Capsule inflated, smooth, the seeds in many rows in each cell, not distinguishable through the walls 1. *parviflora*.

Capsule not inflated, slender, the seeds in one row in each cell, prominently distinguishable through the walls.....2. *prostrata*.

1. *LUDWIGIA PARVIFLORA*, Roxb.; F. B. I. ii. 588; W. & A. 336; Wt. Ill. t. 101.

Almost all Districts, in rice-fields and other wet places.

An erect herb, up to 2 ft. high, the leaves lanceolate or linear-lanceolate up to 3 in. long, the flowers small, the capsule about .3 in. long.

2. *LUDWIGIA PROSTRATA*, Roxb.; F. B. I. ii. 558; Wt. Ic. t. 762.

W. Gháts, swamps in the Anamalais at 2,000 ft. (Beddome).

A herb at first prostrate, then erect, the leaves lanceolate with very slender petioles, together up to 3.5 in. long; the flowers very small, the capsule .5 in. long.

3. *Circaea*, Linn.

Herbs. *Leaves* opposite, petiolate, sinuate-dentate, membranous. *Flowers* very small, white, pedicelled, in terminal and axillary racemes; bracteoles minute. *Calyx*-tube ovoid, shortly produced

above the ovary; lobes 2. *Petals* 2, obcordate, inserted under the margin of the epigynous disk. *Stamens* 2, alternate with the petals; filaments filiform. *Ovary* inferior, 1-2-celled; ovules attached to the inner angle of the cells; style filiform; stigma capitate. *Fruit* small, pyriform, indehiscent, hispid with hooked hairs. *Seeds* 1 in each cell, ellipsoid; cotyledons flat.

CIRCAEA ALPINA, Linn.; F. B. I. ii. 589; Wt. Ill. t. 101.

W. Ghâts, in the Nilgiri and Pulney Hills, at about 7,000 ft., in shady places.

A small, slender herb, reaching about 6-8 in. high, with membranous ovate leaves and 3-seeded fruit.

4. *Trapa*, Linn.

Aquatic floating herbs. *Leaves* dimorphic, the submerged ones opposite, root-like, primatipartite, the floating ones rosulate, rhomboid, the petiole with a spongy swelling near its apex. *Flowers* axillary, solitary, peduncled. *Calyx*-tube short, adnate to the lower part of the ovary; lobes 4, 2 or all becoming spines on the fruit. *Petals* 4, sessile, white, inserted on the margin of the epigynous, cup-shaped disk. *Stamens* 4. *Ovary* 2-celled, semi-inferior with a conical apex; ovule solitary in each cell; pendulous; style subulate; stigma capitate. *Fruit* large, bony, 1-celled, with 4 angles, 2 or all of which spinose, indehiscent, with a short beak through which the radicle is protruded. *Seed* 1, inverted, cotyledons very unequal; radicle incurved.

TRAPA BISPINOSA, Roxb. Cor. Pl. t. 234; F. B. I. ii. 590; W. & A. 337.

Most plains Districts, floating in tanks, sometimes cultivated. The Water-Chestnut.

A plant with long stems bearing pectinate leaves (stipules, according to some authors) beneath the surface and curious rhomboid rosulate leaves with swollen petioles on the surface. The 2-spined fruit is eaten, either raw or cooked, and gives much starch. Vern. *Hind.* Singhara.

Var. *incisa*, Wall. Leaves smaller, more deeply incised at the margins, less villous; fruit smaller. W. Coast Districts (Wight).

Oenothera rosea, Ait., and *O. tetraptera*, Cav., also perhaps some other species, are found in gardens and apparently run

wild on the Nilgiri Hills, and sometimes on other hills in the Deccan and W. Gháts.

Family LXIX. SAMYDACEAE.

Trees or shrubs. *Leaves* alternate, rarely opposite, petiolate, simple, entire, crenate or serrate, often with pellucid glands; stipules small or 0. *Flowers* regular, usually hermaphrodite, small, in axillary or subterminal fascicles racemes or panicles; pedicels articulate, bracteolate. *Calyx* coriaceous, persistent, tube short or long, sometimes adnate to the ovary; lobes 3-7, imbricate or valvate. *Petals* as many as the calyx-lobes or 0, perigynous. *Stamens* definite or indefinite, often alternating with staminodes, sometimes fascicled opposite the petals; anthers didymous or oblong. *Ovary* 1-celled, superior or half-superior; ovules many, on 2-5 parietal placentas; style 1 with capitate stigma, or styles 2-5. *Fruit* a loculicidal 2-5-valved capsule, the valves alternating with the placentas. *Seeds* few or many, oblong or angular, sometimes arillate, albuminous.

Petals 0; flowers in axillary fascicles.....1. **Casearia**.
 Petals present; flowers in axillary or subterminal, sometimes panicked,
 racemes 2. **Homalium**.

1. **Casearia**, Jacq.

Shrubs or trees. *Leaves* alternate, distichous, petioled, entire or serrate, with pellucid transparent glands, usually both as dots and lines; stipules small, lateral, caducous. *Flowers* small, greenish-yellow, in axillary fascicles (Indian species); pedicels jointed above their base, surrounded by many scale-like bracteoles. *Calyx* inferior, deeply 4-5-lobed; lobes imbricate, obtuse, persistent. *Petals* 0. *Stamens* normally twice as many as the calyx-lobes, alternating with as many staminodes tufted at their apex, the stamens and staminodes forming a ring attached below to the calyx-tube; filaments subulate. *Ovary* free, ovoid, 1-celled; ovules many, on (usually 3) parietal placentas; style simple; stigma capitate or 3-fid. *Fruit* a succulent, ellipsoid, 3- or rarely 2-valved capsule, angled or ribbed when dry. *Seeds* many, angular or obovoid, with an enveloping fleshy coloured (usually

orange or red) aril; testa coriaceous or crustaceous; albumen fleshy; cotyledons flat; radicle terete, superior.

Leaves glabrous:—

Leaves broadly elliptic, coriaceous when old:—

Leaves rounded at base, obtuse or very shortly pointed at apex; blade up to 6–7 in. long, 4 in. broad, crenate-serrate, prominently reticulate; capsule 7 in. long, yellow.....1. *graveolens*.

Leaves attenuate at base, acuminate at apex, the acumen twisted; blade up to 6 in. long, 3 in. broad, entire, shining above, not prominently reticulate; capsule 7 in. long....2. *rubescens*.

Leaves narrowly elliptic, chartaceous when old:—

Leaves elliptic-oblong or -lanceolate, attenuate at base, acute or acuminate at apex, the acumen twisted; blade up to 5 in. long, 2 in. broad, entire or distantly serrate, reticulate beneath; capsule 5 in. long or less, orange.....3. *esculenta*.

Leaves elliptic-oblong, cuneate at base, acuminate at apex; blade up to 6 in. long by 2.5 in. broad, entire, pale, main nerves prominent; capsule up to 1 in. long, bright orange 4. *varians*.

Leaves obovate, coriaceous, cuneate at base, obtuse or shortly-pointed at apex; blade up to 4 in. long, 2.25 in. broad, often cucullate, entire, pale, but usually drying nearly black; capsule 7 in. long, orange-yellow5. *coriacea*.

Leaves hairy:—

Leaves thick, branchlets and inflorescence softly pale brown-tomentose; leaves subcoriaceous, oblong, unequally rounded at base, acuminate at apex; blade up to 6 in. long, 2.5 in. broad, crenate-serrate; capsule 5–8 in. long, yellow.....6. *tomentosa*.

Leaves and slender branchlets and inflorescence rufous-villous; leaves membranous, oblanceolate, long and sharply acuminate; blades up to 5 in. long, 2 in. broad, sharply serrate; capsule small, orange.....7. *wynadensis*.

1. *CASEARIA GRAVEOLENS*, Dalz.; F. B. I. ii. 592.

N. Circars, in Ganjam, chiefly on old cultivated lands.

A small deciduous tree conspicuous in forest by its rather large leaves turning red in winter before falling. Bark dark grey; wood light yellow, moderately hard, even-grained. Vern. *Hind*. Chilla; *Ur*. Giridi.

2. *CASEARIA RUBESCENS*, Dalz.; F. B. I. ii. 593.

W. Ghâts, in the forests of Coorg (G. Thomson); hills of Travancore, 3,500 ft. (Bourdillon).

A large shrub, apparently evergreen, the glabrous branchlets

with large lenticels. The Travancore specimens have more lanceolate leaves.

3. *CASEARIA ESCULENTA*, Roxb.; F. B. I. ii. 592.

E. Coast, in the Circars and southwards; Striharikota and similar forests of the Carnatic; W. Coast, from S. Canara to Cochin.

A small tree with many fascicles of flowers from the leaf-axils, apparently evergreen. Roxburgh says the leaves are eaten. Vern. *Tel.* Kunda jungara.

4. *CASEARIA VARIANS*, Bedd. Fl. t. 208, *not of* Thw.

Evergreen forests of Travancore up to 3,000 ft.

A small glabrous apparently evergreen tree. Bark green, smooth; wood yellowish-white, even-grained. Vern. *Mal.* Vella kunnan.

5. *CASEARIA CORIACEA*, Thw.; F. B. I. ii. 592.

W. Gháts, Shola forests of the Nilgiris, Anamalais and Pulneys above 6,000 ft.

An evergreen tree with yellowish-white smooth bark.

6. *CASEARIA TOMENTOSA*, Roxb.; F. B. I. ii. 593; Brand. For. Fl. t. 31. *C. elliptica*, Willd.; Wt. Ic. t. 1849.

All plains forest Districts of the Circars, Deccan and Carnatic, very common in open, much-grazed lands; rare in W. Gháts, W. side.

A bushy shrub or small deciduous tree in open lands, a much larger tree in forest, the oblong leaves generally tomentose, sometimes nearly glabrous. Bark thick, pale; wood yellowish-white, close-grained. Vern. *Hind.* Chilla; *Ur.* Girari; *Tel.* Chilaka duddi.

7. *CASEARIA WYNADENSIS*, Bedd. Ic. t. 160; F. B. I. ii. 594.

W. Gháts, in the forests of Malabar, Travancore and Tinnevely at 2,000-3,000 ft.

A small villous tree with slender branchlets and trifid stigmas.

2. *Homalium*, Jacq.

Trees or shrubs. *Leaves* alternate, crenate or serrate, rarely entire, petiolate; stipules small or 0. *Flowers* small, in slender axillary and subterminal, simple or paniced, racemes; bract at the base of the pedicel often prominent, caducous. *Calyx*-tube turbinate, adnate to the base of the ovary; lobes 5-7, narrow

persistent. *Petals* 5-7, inserted in the throat of the calyx, persistent. *Stamens* opposite the petals, solitary or in fascicles, alternating with glandular staminodes. *Ovary* half-superior, 1-celled; ovules many, on parietal placentas near the top; styles 2-5, filiform; stigmas capitellate. *Fruit* a coriaceous capsule, 2-5-valved at the apex. *Seeds* small, oblong or angular; albumen fleshy; cotyledons foliaceous.

Stamens solitary opposite each petal:—

Racemes simple, elongate:—

Leaves obovate, obtuse or emarginate and very shortly apiculate at apex, tomentose beneath, repand-crenate, main nerves about 12 pairs, parallel and with parallel transverse nervules; sepals and petals very similar1. *tomentosum*.

Leaves elliptic, abruptly acuminate at apex, glabrous beneath, coarsely crenate, main nerves 6-8 pairs, arching and rather irregular, reticulate between; petals larger than the sepals

2. *zeylanicum*.

Racemes in panicles; leaves ovate or elliptic, acuminate at apex, puberulous beneath, crenate, main nerves about 8 pairs, rather irregular and reticulate between; petals longer and broader than the sepals 3. *nepalense*.

Stamens in fascicles of 3-4 opposite each petal; racemes simple, up to 6 in. long; leaves ovate, bluntly acute or acuminate at apex, glabrous, crenate, main nerves about 7-8 pairs, irregular; petals much longer than the sepals.....4. *travancoricum*.

1. *HOMALIUM TOMENTOSUM*, Benth.; F. B. I. ii. 596.

N. Circars, in the forests of Ganjam (Gamble).

A large deciduous tree, the flowers in long racemes, the leaves in young trees and shoots sometimes up to 10 in. long and 5 in. broad. Bark thin, greyish-white; wood brown, hard and heavy.

2. *HOMALIUM ZEYLANICUM*, Benth.; F. B. I. ii. 596; Bedd. Fl. t. 210. *Blackwellia tetrandra*, Wt. Ic. t. 1851.

W. Gháts, in evergreen forests up to 3,000 ft., common on old coffee estates.

A large evergreen tree, the young leaves bright red, the flowers fragrant. Bark pale, rough; wood brownish-red, hard. Vern. *Mal.* Manthala mukki.

3. *HOMALIUM NEPALENSE*, Benth.; F. B. I. ii. 596. *Blackwellia nepalensis*, Wall. Pl. As. Rar. t. 179.

E. Gháts, Mahendragiri Hill in Ganjam at 4,500 ft., Rumpā Hills of Godavari (Gamble).

A tree with creamy-white bark and moderately hard white wood.

4. *HOMALIUM TRAVANCORICUM*, Bedd. Fl. 211; F. B. I. ii. 598.

W. Gháts, hills of S. Travancore and Tinnevely, in ever-green forests at low levels.

A medium-sized ornamental tree with greenish-white flowers.

Family LXX. TURNERACEAE.

TURNERA ULMIFOLIA, Linn., is a West Indian plant with bright yellow flowers, a common weed of roadsides and waste ground, especially along the Coromandel Coast. The chief varieties are var. *elegans*, Urb., with ovate coarsely-toothed, and var. *angustifolia*, Willd., with lanceolate serrate leaves. The former seems the most common on the W. Coast, the latter on the East.

Family LXXI. PASSIFLORACEAE.

Shrubs or herbs, usually climbing by means of tendrils. *Leaves* alternate, simple or lobed, frequently glandular beneath, petiole often glandular; stipules 2, deciduous or persistent, sometimes 0; tendrils axillary or 0. *Flowers* regular, hermaphrodite or unisexual, axillary, solitary racemose or cymose-paniculate, often showy; bracteoles 3, minute and scattered or foliaceous and forming an epicalyx, rarely 0. *Calyx*-tube short or long, coriaceous or membranous, persistent; lobes 5, imbricate. *Petals* 0, or 5 attached to the calyx-tube, free or connate, imbricate, often marcescent. *Corona* of one or more rows from the calyx-tube, tubular or split into erect or radiating filaments, sometimes 0. *Stamens* 5, on a gynandrophore or free at the base, perigynous; anthers oblong, 2-celled, basi-fixed or versatile, introrsely dehiscing. *Ovary* superior, on a gynophore or sessile, 1-celled with 3 parietal placentas and numerous ovules; styles 1 or 3; stigmas reniform capitate or flattened. *Fruit* a berry or capsule. *Seeds* numerous, ovoid or flattened, often pitted, with a fleshy aril; albumen fleshy; cotyledons leafy; radicle short, terete.

Flowers hermaphrodite, usually large; corona of corolla conspicuous; fruit a large fleshy berry 1. **Passiflora**.

Flowers unisexual, small; corona small or none; fruit a capsule

2. **Adenia**.

1. **Passiflora**, Linn.

Twining herbaceous or shrubby plants, tendril-bearing. *Leaves* simple or palmately lobed, usually glandular beneath at the base or on the petiole; stipules slender or leafy. *Flowers* hermaphrodite, solitary or cymose; bracteoles 3. *Calyx*-tube fleshy; lobes 5. *Petals* 5, inserted on the throat of the calyx. *Corona* of 1 to several rows of numerous usually filiform segments with 1 or more membranous folds lower down and a shallow cup surrounding the gynandrophore. *Stamens* 5, from the gynandrophore; anthers oblong, dorsifixed. *Ovary* 1-celled, many-ovuled; styles usually 3. *Fruit* a fleshy indehiscent berry. *Seeds* many, arillate, often pitted; albumen fleshy; cotyledons foliaceous.

•PASSIFLORA LESCHENAUTh, DC.; F. B. I. ii. 599; W. & A. 352; Wt. Ic. t. 39.

W. Gháts, in the Nilgiris and Pulneys, above 5,000 ft.

A climbing shrub with curious semi-orbicular leaves, rounded at base, broadly truncate and 3-cuspidate above, white flowers and yellowish ovoid berry with pitted seeds.

Passiflora edulis, Sims, the Passion fruit from Brazil, is sometimes cultivated in the hills and may occasionally be found run wild. It has 3-lobed toothed leaves. *P. calcarata*, Mast., is a Madagascar species with 3-lobed leaves and large prominent stipules, run wild and now common on the Nilgiris. *P. foetida*, Linn., is a tropical American species commonly run wild near towns and along roadsides in many places in the plains and at once recognised by the moss-like pectinate involucre of the flowers. Several other species are also found in gardens.

2. **Adenia**, Forsk.

Twining herbs or undershrubs, tendril-bearing. *Leaves* entire, palmately lobed or pinnatifid, usually with large glands on the leaves and the top of the petiole; stipules 0 or inconspicuous. *Flowers* monoecious, usually small, in axillary cymes, the

peduncles often produced into tendrils. *Calyx*-tube campanulate or tubular; lobes 4-5. *Petals* 4-5, inserted on the throat or bottom of the calyx-tube. *Male flowers*: stamens 4-5, at the bottom of the calyx-tube, opposite as many scales or glands; filaments free or connate; anthers basifixed; ovary rudimentary or 0. *Female flowers*: staminodes 4-5, opposite as many scales or glands; ovary stalked or sessile; ovules numerous, attached to 3 parietal placentas; style 0 or 3-fid; stigmas 3. *Fruit* a loculicidal 3-valved capsule. *Seeds* numerous, arillate, flattened, usually pitted; funicle long; albumen fleshy; cotyledons foliaceous.

Flowers very small; petals attached to the throat of the calyx-tube, small, obovate; anthers short, filaments combined in a tube; corona a fringe of short hairs at the bases of the petals; leaves ovate, entire or hastate or palmately 3-lobed, glandular at the top of the petiole; capsule 1 in. long 1. *Wightiana*. Flowers rather large; petals attached to the base of the calyx-tube, linear-spathulate, long-fringed; anthers long, filaments forming a cup below; leaves palmately 3-5-lobed, rarely undivided, glandular at the sinuses and base; capsule 2 in. long 2. *palmata*.

1. ADENIA WIGHTIANA, Engl. *Modecca Wightiana*, Wall.; F. B. I. ii. 601; W. & A. 353; Wt. Ic. t. 179.

Deccan and Carnatic, in dry hilly country from N. Arcot southwards, at low levels.

A tuberous-rooted slender climber with very small flowers, the petioles much twisted.

2. ADENIA PALMATA, Engl. *Modecca palmata*, Lamk.; F. B. I. ii. 603; W. & A. 353; Wt. Ic. t. 201.

Hills of the Carnatic, W. Gháts and W. Coast in moist hilly country at low levels.

A large tuberous-rooted woody climber, the stems thickened at the nodes, the leaves large and deeply palmate.

Family LXXII. CARICACEAE.

CARICA PAPAYA, Linn., the Papaw tree, a soft-wooded, almost branchless tree, introduced from South America, is cultivated in gardens in the plains Districts for its valuable edible fruit, which is of the size of a small melon with a soft yellow pulp. Vern. *Hind*. Papáya, Popai.

Family LXXIII. CUCURBITACEAE.

Herbs or undershrubs, rarely shrubs, prostrate or climbing by means of tendrils spirally twisted. *Leaves* alternate, petioled, simple or lobed or palmately or pedately divided, often cordate at base; stipules usually 0. *Flowers* regular, monoecious or dioecious, yellow or white, solitary paniculate or racemose. *Calyx*-tube usually adnate to the ovary; limb rotate campanulate or tubular, lobes 5, rarely 3-6, imbricate. *Petals* as many as the calyx-lobes, free or gamopetalous, sometimes lobed or fimbriate, valvate or involute in bud. *Stamens* inserted at the mouth, near the middle or at the base of the calyx-tube, usually 3; anthers free or connate, usually 1 1-celled, the others 2-celled, the cells straight, flexuose or conduplicate, the connective sometimes produced; in ♀ flowers staminodes often present. *Ovary* inferior, usually of 3 connate carpels; ovules usually many, horizontal, rarely few and erect or pendulous; placentas usually 3, vertical, parietal or partly intruded, and so spuriously 3-celled; style 1 with 3 stigmas, rarely styles 2-4; in ♂ flowers pistillodes often present. *Fruit* usually a fleshy berry, indehiscent or dehiscing by valves or by a circumscissile lid. *Seeds* usually many, in pulp or fibre, often compressed; outer testa often corrugate and margined, inner membranous; albumen 0; cotyledons fleshy or foliaceous, radicle short.

Ovules horizontal:—

Anther-cells flexuose or conduplicate:—

Corolla rotate or campanulate, 5-partite to the base:—

Petals fimbriate on the margins.....1. **Trichosanthes.**

Petals entire:—

Calyx-tube of ♂ elongate; anthers cohering, included:—

Pistillodes 1-3, subulate; tendrils simple; fruit small, acute at both ends; slender climbers...2. **Gymnopetalum.**

Pistillodes glandular or 0; tendrils bifid; fruit very large, variously shaped; stout climber **Lagenaria.**

Calyx-tube of ♂ short; anthers free or slightly cohering, usually exsert:—

Stamens free, inserted on the mouth of the calyx; ♂ flowers usually with a large bract; tendrils simple...3. **Momordica.**

Stamens free, inserted on the tube of the calyx:—

♂ flowers in racemes; fruit fibrous, opening by a stopple at the apex; tendrils 2-5-fid 4. **Luffa.**

♂ flowers solitary or fascicled:—

Calyx-lobes subulate, entire, erect; scaberulous herbs:—

Pistillode 0; tendrils bifid; seeds pyriform, surrounded by a thick crenulate ring ... 5. **Bryonopsis.**

Pistillode glandular; seeds compressed, usually smooth:—

Connective produced; tendrils simple... 6. **Cucumis.**

Connective not produced; tendrils 2-3-fid

7. **Citrullus.**

Calyx-lobes subfoliaceous, serrate, reflexed; tendrils

2-fid; large hairy climber..... **Benincasa.**

Corolla campanulate, 5-lobed to the middle or lower; tendrils usually simple:—

Filaments connate; stigma 1, 3-lobed; flowers white or yellow; slender climbing or prostrate herbs; seeds compressed, margined, velvety or scrobiculate 8. **Coccinia.**

Filaments free; stigmas 3-5, bilobed; flowers yellow, very large; large climbing hispid or hairy herbs; seeds compressed

Cucurbita.

Anther-cells straight or curved, not flexuose:—

Disk around the style annular or cupular; tendrils simple, rarely bifid; seeds ovoid or subglobose, smooth or rugose, usually compressed and margined..... 9. **Melothria.**

Disk around the style 0 or obscure; tendrils simple:—

Stamens inserted on the tube of the calyx:—

Petiole of leaf with a stipuliform bract; seeds marginate, hollowed on one side, convex on the other; connective of anthers not produced at apex 10. **Blastania.**

Petiole of leaf not stipulate; connective of anthers produced at apex:—

• Fruit indehiscent; seeds marginate, smooth

11. **Kedrostis.**

Fruit circumsciss near the base; seeds appressed-pilose, not marginate, scarcely compressed..... 12. **Corallocarpus.**

Stamens inserted on the mouth of the calyx-tube; fruit depressed-globose; seeds ovoid, smooth, marginate

13. **Cerasiocarpum.**

Ovules pendulous:—

Leaves pedate with 3-5 leaflets; tendrils simple; seeds verrucose, not winged; slender climbers..... 14. **Gynostemma.**

Leaves simple; tendrils simple or bifid; seeds compressed, with a broad membranous wing; scandent shrubs.....15. *Zanonia*.

1. *Trichosanthes*, Linn.

Herbaceous climbers. *Leaves* entire or palmately lobed rarely pinnate, denticulate; tendrils simple or 2-5-fid. *Flowers* dioecious, rarely monoecious, white; ♂ usually racemose, bracteolate; ♀ solitary. *Calyx*-tube long, cylindric, dilated above; lobes 5, entire serrate or laciniate. *Petals* 5, connate at the base, margins long-fimbriate. *Stamens* 3, inserted in the calyx-tube; filaments very short; anthers connate, 2 2-celled, the third 1-celled, the cells conduplicate; in ♀ flowers staminodes 0. *Ovary* inferior, ovoid or fusiform, 1-celled with 3 parietal placentas; ovules very many, usually horizontal; style slender; stigmas 3, entire or bifid; in ♀ flowers pistillodes 0. *Fruit* a glabrous ovoid or fusiform indehiscent berry, usually smooth. *Seeds* many, embedded in pulp, ellipsoid or angular.

Female flowers without or with very small bracts:—

Leaves entire, cordate, distantly denticulate, prominently reticulate:—

Male racemes few-flowered, straight; calyx-teeth short, lanceolate

1. *nervifolia*.

Male racemes many-flowered, geniculate; calyx-teeth elongate, subulate.....2. *cuspidata*.

Leaves lobed:—

Male racemes without bracts; leaves deeply and usually acutely lobed, denticulate, the end teeth subulate; fruit ovoid-fusiform, short3. *cucumerina*.

Male racemes with very small bracts:—

Pedicels much shorter than the flowers; lobes of the leaves rounded, very faintly denticulate; fruit very long, narrow, twisted.....4. *anguina*.

Pedicels longer than the flowers:—

Leaves glabrous on both sides, 3-lobed, with distant subulate teeth; petals rather shortly fimbriate4. *Perrottetiana*.

Leaves densely villous beneath, 5-7-lobed, with shallow sinuses and subulate teeth; petals long-fimbriate, the inflorescence and petiole very villous.....5. *villosula*.

Male racemes with large bracts, the bracts broad, laciniate:—

Calyx-lobes shortly dentate; leaves very variable, usually scabrous and often deeply lobed6. *palmata*.

Calyx-lobes deeply divided, the divisions subulate ; leaves soft, not deeply lobed and hardly scabrous 7. *Lepiniana*.

Female flowers bracteate, either few with lanceolate bracts or many with laciniate bracts ; leaves 3-5-lobed, very scabrous above, pubescent beneath, irregularly and deeply serrate 8. *anamalayana*.

1. TRICHOSANTHES NERVIFOLIA, Linn. ; F. B. I. ii. 609, *in part* ; W. & A. 349.

W. Gháts, in Coorg, Nilgiris and Pulneys, at low levels.

A slender twining herb with reticulate leaves and ovoid acute fruit, green with white lines, afterwards red above, the seeds flattened with angular projections on the margins, the faces rugose.

2. TRICHOSANTHES CUSPIDATA, Lamk. ; W. & A. 349. *T. nervifolia*, Linn. ; F. B. I. ii. 609, *in part*.

W. Coast, in Travancore and Malabar.

A slender twiner with reticulate leaves and characteristically geniculate zig-zag racemes.

3. TRICHOSANTHES CUCUMERINA, Linn. ; F. B. I. ii. 609 ; W. & A. 350. *T. lobata*, Roxb. ; F. B. I. ii. 610.

Deccan and W. Coast, in plains country and in lower hills.

A slender annual climber with rather shortly laciniate small white flowers, deeply 5-lobed leaves and an ovoid fusiform fruit, green and striped when fresh, scarlet or orange when ripe, up to 3 in. long.

4. TRICHOSANTHES PERROTTETIANA, Cogn. Monog. 362.

Carnatic, at Pondicherry (Perrottet, *from description*).

A slender climber with 3-lobed leaves and deep basal sinus, the racemes slender, long-peduncled.

5. TRICHOSANTHES VILLOSULA, Cogn. Monog. 362.

W. Gháts, in the Nilgiri Hills at 5,000-6,000 ft.

A rather stout herbaceous climber with conspicuously villous stems, petioles and inflorescence and very long laciniae to the petals of the rather large white flowers ; the fruit ovoid, acuminate, 2.5 in. long.

6. TRICHOSANTHES PALMATA, Roxb. ; F. B. I. ii. 606 ; W. & A. 350 ; Wt. Ill. tt. 104, 105. *T. bracteata*, Voigt ; Cogn. Monog. 375.

W. Gháts, in all Districts, up to 5,000 ft., common.

A large woody climber with palmate deeply-lobed but very variable leaves, scabrous-dotted above, conspicuous large

bracts and a large globose red orange-streaked fruit, not edible. Vern. *Tam.* Anacoruthay; *Tel.* Abuva.

Var. *tomentosa*, Heyne; F. B. I. ii. 607. Leaves much less lobed, scarcely scabrous, tomentose beneath; bracts and calyx-lobes more deeply laciniate.

W. Gháts, in the Mysore Hills, Pulneys and Nilgiris at about 3,000–6,000 ft.

7. *TRICHOSANTHES LEPINIANA*, Cogn. Monog. 377.

Carnatic, at Pondicherry (Lépine); W. Gháts, in the Nilgiris and Pulneys.

A large strong-growing climber with palmately 3–5-lobed leaves and deeply laciniate calyx-lobes.

8. *TRICHOSANTHES ANAMALAYANA*, Bedd.; Cogn. Monog. 378.

W. Gháts, in the Anamalai Hills at 4,000 ft. (Bedd. *from description*).

Apparently a large species but very little known.

Trichosanthes Anguina, Linn., is the Snake Gourd cultivated for its long twisted fruit, which may reach 3 ft. in length and 3 in. in diam. and is used as a vegetable. In leaves and flowers it greatly resembles *T. cucumerina*. Vern. *Hind.* Chachinda.

2. *Gymnopetalum*, Arn.

Twining slender pubescent or scabrous herbs; tendrils usually simple. *Leaves* cordate, 5-angular or 3–5-lobed. *Flowers* white or yellow, dioecious or monoecious, ♂ solitary or racemose, ♀ solitary. *Calyx*-tube elongate, tubular, contracted near the mouth; lobes 5, subulate. *Corolla* rotate, deeply 5-partite, the lobes oblong or obovate. *Stamens* 3, included, inserted on the middle of the calyx-tube; filaments short, free; anthers 3, connate, 1 1-celled, the others 2-celled, the cells linear, longitudinally conduplicate; in ♀ staminodes 3, minute or 0. *Ovary* ovoid or oblong; ovules numerous, on 3 placentas; style filiform; stigmas 3, linear; in ♂ pistillodes 1–3, subulate. *Fruit* an ovoid oblong berry acute at both ends. *Seeds* many or few, obovoid or oblong, compressed, marginate, nearly smooth.

GYMNOPETALUM WIGHTII, Arn.; F. B. I. ii. 611; Trim. Fl. Ceyl. t. 43. *G. tubiflorum*, Cogn. Monog. 388. *Bryonia tubiflora*, W. & A. 347.

W. Coast from S. Canara (Hohenacker) to Travancore; W. Gháts, in the Anamalai Hills at 3,000 ft. (Gamble).

A very slender climber with yellow flowers and membranous leaves, the seeds oblong, truncate at the ends.

3. *Momordica*, Linn.

Climbing annual or perennial herbs; tendrils simple. *Leaves* entire, lobed or pedately 3-7-foliolate. *Flowers* yellow or white, monoecious or dioecious, the ♂ solitary or racemed, the ♀ solitary; bracts present or 0, usually on the peduncle. *Calyx*-tube short, campanulate; lobes 5, ovate. *Petals* 5, shortly connate below, the corolla rotate or campanulate. *Stamens* 3, rarely 2; filaments short; anthers at length free, 1 1-celled, the others 2-celled, the cells conduplicate or rarely horseshoe-shaped; in ♀ flowers staminodes 0 or of 3 glands. *Ovary* oblong, 1-celled; ovules many, horizontal, on 3 vertical placentas; style long; stigmas 3; in ♂ flowers pistillode 0 or glandular. *Fruit* an oblong or spherical, smooth or rough berry or a 3-valved capsule. *Seeds* many or few, obovate or flattened, smooth or variously sculptured.

Male flowers solitary:—

Flowers monoecious; flower-peduncles bracteate at the middle or near the base; leaves orbicular-reniform, deeply pedately 5-7-lobed; fruit fusiform, rostrate, tuberculate; seeds compressed, subrectangular, rugose on the faces.....1. *Charantia*.

Flowers dioecious; bract near the top of the peduncle:—

Petioles without glands:—

Calyx-lobes linear-lanceolate, acute; leaves ovate, cordate, entire or somewhat 3-5-lobed; fruit ellipsoid with soft spines

2. *dioica*.

Calyx-lobes ovate-oblong, obtuse; leaves broadly ovate, deeply cordate, entire or somewhat 3-5-lobed; fruit ellipsoid, densely softly echinate.....3. *subangulata*.

Petioles glandular; calyx-lobes lanceolate, acute; leaves large, palmate, cordate, usually 3-lobed; fruit ovoid with raised points

4. *cochinchinensis*.

Male peduncles 2-5-flowered; flowers monoecious; bract at the top of the peduncle in ♂, near the middle in ♀; calyx-lobes lanceolate, acute; leaves orbicular, reniform, deeply cordate, shortly 5-7-lobed; fruit pyriform or fusiform; seeds broadly ovoid, smooth... 5. *tuberosa*.

Male peduncles many-flowered; flowers dioecious; bract very small, towards the base of the peduncle in ♀, near the middle in ♂; calyx-lobes lanceolate; leaves ovate-cordate, denticulate, about 4 in. by

3 in., 5-7-lobed, the end lobes long and acute; fruit ovoid, rostrate, covered with triangular papillae.....6. *denudata*.

1. *MOMORDICA CHARANTIA*, Linn.; F. B. I. ii. 616; W. & A. 348; Wt. Ic. t. 504.

All plains Districts, cultivated and commonly found run wild.

A slender twining annual herb with pale yellow flowers and an edible fruit of a bright orange colour, with crimson pulp, and covered with raised tubercles. Vern. *Hind. Karéla*; *Tam. Pava kai*.

2. *MOMORDICA DIOICA*, Roxb.; F. B. I. ii. 617; W. & A. 348; Wt. Ic. tt. 505, 506.

Plains Districts of the Carnatic and W. Coast, in the hills up to 4,000 ft.

A perennial tuberous-rooted climber with yellow flowers and an orange-coloured muricate fruit, up to about 2 in. long, sometimes eaten, as are the tubers. Vern. *Tel. Puagakara*.

3. *MOMORDICA SUBANGULATA*, Bl.; Cogn. Monog. 443.

W. Gháts, from S. Canara to Wynaad, up to 3,000 ft.

A pretty climber with large yellowish petals conspicuously veined.

4. *MOMORDICA COCHINCHINENSIS*, Spr.; F. B. I. ii. 618. *M. mixta*, Roxb.; W. & A. 349.

Deccan and W. Gháts, in S. Canara and Mysore.

A handsome large climber with large petals, creamy-white tinged with yellow, and black claws; fruit bright red, ovoid, 4-5 in. long, covered with conical points, seeds very large.

5. *MOMORDICA TUBEROSA*, Cogn. *M. Cymbalaria*, Fenzl; F. B. I. ii. 618. *Luffa tuberosa*, Roxb.; W. & A. 1068.

Deccan and Carnatic, in Mysore, Bellary and Anantapur and down to Tinnevely, on black cotton soil.

A trailing plant with herbaceous shoots from a large tuberous rootstock, petals white, tinged pale yellow, fruit dark green and ribbed, about 1 in. long, said to be edible.

6. *MOMORDICA DENUDATA*, Thw.; F. B. I. ii. 618.

W. Coast, at Quilon in Travancore (Wight).

A slender climber with membranous leaves.

4. Luffa, Tourn.

Annual climbing herbs, large or small; tendrils 2-5-fid. *Leaves* 5-7-lobed, rarely subentire; petiole not glandular at the apex. *Flowers* monoecious, yellow or white; ♂ flowers in racemes, ♀ flowers solitary, both often from the same axil. *Calyx*-tube in ♂ turbinate or campanulate, in ♀ produced beyond the ovary; lobes 5, triangular or lanceolate. *Petals* 5, free, spreading, obovate or obcordate. *Stamens* 3, less often 4 or 5, inserted on the calyx-tube; filaments free or connate; anthers exserted, free, 1 1-celled, the others 2-celled, the cells sigmoid, often on a broad connective; in ♀ flowers staminodes 3 or more, thick. *Ovary* oblong, 1-celled; ovules many, horizontal, on 3 parietal placentas; style cylindric; stigma 3-lobed; in ♂ flowers pistillode 0 or glandular. *Fruit* a large or small oblong or cylindric, smooth or angled or spinous, fibrous berry, usually dehiscing by a circumsciss opening at the top with a stopple. *Seeds* many, oblong, compressed.

Stamens 5; fruit large, cylindric, 5-12 in. long, smooth, 10-ribbed or somewhat 10 angled; seeds narrowly winged, smooth on sides; leaves orbicular-reniform, palmately 5-lobed, scabrous and punctate; petals obtuse 1. *aegyptiaca*.

Stamens 3:—

Fruit oblong-clavate with 10 sharp angles; seeds not winged, slightly rugose on the sides; leaves orbicular-cordate, palmately 5-7-lobed, scabrous; petals emarginate 2. *acutangula*.

Fruit small, spinous, the spines woolly; seeds thinly verrucose; leaves ovate-cordate, slightly 3-5-lobed, scabrous 3. *umbellata*.

1. LUFFA AEGYPTIACA, Mill.; F. B. I. ii. 614. *L. pentandra*, Roxb.; W. & A. 343; Wt. Ic. t. 499.

All plains Districts, especially near the coast, cultivated and run wild, but doubtfully indigenous.

A large climbing plant with smooth fruit, edible when young, and when old the fibrous skeleton forms a flesh-brush "loofa." Vern. *Hind.* Ghia taroi.

2. LUFFA ACUTANGULA, Roxb.; F. B. I. ii. 713. *L. amara*, Roxb.; W. & A. 343.

Most plains Districts, especially near the E. Coast, not common.

A climber with angular fruit, and usually (var. *amara*,

C. B. Clarke) with scabrous and pubescent leaves, the fruit small.

3. LUFFA UMBELLATA, Roem. *L. Kleinii*, W. & A. 344; F. B. I. ii. 616.

W. Coast, in Travancore, scarce.

A slender branching climber.

5. Bryonopsis, Arn.

Annual scaberulous scandent herbs; tendrils 2-fid. *Leaves* deeply palmately 5-lobed. *Flowers* monoecious, ♂ and ♀ fasciated, often in the same axils. *Calyx*-tube broadly campanulate; lobes 5, subulate. *Corolla* campanulate, 5-partite; lobes ovate. *Stamens* 3, free, inserted on the tube of the calyx; filaments short; anthers cohering, 1 1-celled, 2 2-celled, the cells linear, flexuose round the broad connective not produced at the apex; staminodes in ♀ 3, small. *Ovary* globose or ovoid; ovules numerous, horizontal, on 3 placentas; style slender; stigmas 3, papillose, deeply 2-lobed; pistillodes in ♂ flowers 0. *Fruit* a spherical or ovoid-conical pulpy many-seeded berry. *Seeds* pyriiform, surrounded by a thick grooved crenulate ring on either side of which project the swollen faces of the seed.

BRYONOPSIS LACINIOSA, Naud. *Bryonia laciniosa*, Linn.; F. B. I. ii. 622; W. & A. 345; Wt. Ic. t. 500.

Most Districts, in hedges and on bushes, up to 4,000 ft. in the hills.

A slender climbing annual from a thick permanent rootstock, stems angular; berries conspicuous, 5 to 1 in. in diam., brick-red when ripe with white vertical lines.

6. Cucumis, Linn.

Annual herbs or with a perennial root, climbing or trailing, hispid or scabrous; tendrils simple. *Leaves* entire or palmately 3-7-lobed or 5-angled, dentate or serrate. *Flowers* yellow, monoecious, short-peduncled, ♂ in clusters in the axils, ♀ solitary. *Calyx*-tube turbinate or campanulate; lobes 5. *Corolla* campanulate; lobes 5, oblong or ovate, acute. *Stamens* 3, free, 1 1-celled, 2 2-celled, the cells conduplicate, the connective produced above in a crest; in ♀ flowers staminodes 3, setiform or ligulate. *Ovary* in ♂ a broad gland-like pistillode, in ♀ ovoid or globose; ovules

many, horizontal, on 3 vertical placentas; style short; stigmas 3, obtuse; in ♂ flowers pistillode glandular. *Fruit* a large or small, spherical or elongate, smooth or tuberculate or spinous berry, indehiscent. *Seeds* very many, oblong or elliptic, compressed, usually smooth.

Fruit smooth, glabrous or pubescent; leaves suborbicular-reniform, cordate at base; ovary densely softly villous:—

Annual; leaves shallowly 5-angled or slightly lobed, softly villous; ♂ flowers in clusters:—

Fruit ovoid, obtuse at both ends, 1-1.5 in. long; leaves rather small, thick 1. *pubescens*.

Fruit globose ovoid or elongate, large; leaves large and thin

Melo.

Perennial; leaves deeply palmately 5-lobed, scabrous; ♂ flowers usually solitary 2. *trigonus*.

Fruit softly spinous; perennial trailing herb with cinereous very scabrid leaves 3. *prophetarum*.

Fruit with few scattered tubercular prickles, cylindric, yellowish-green; ♂ flowers in fascicles; leaves with angular lobes *sativus*.

1. CUCUMIS PUBESCENS, Willd.; W. & A. 342; Wt. Ic. t. 496; *C. trigonus*, Roxb.; F. B. I. ii. 619, *in part*.

E. Coast Districts, on waste ground.

A climbing or trailing plant, the fruit ovoid, striped dark and light green.

2. CUCUMIS TRIGONUS, Roxb.; F. B. I. ii. 619, *in part*; W. & A. 342; Wt. Ic. t. 497.

Deccan and Carnatic, in dry Districts.

A prostrate plant from a perennial rootstock, the fruit yellow or yellow with green stripes.

3. CUCUMIS PROPHETARUM, Linn; F. B. I. ii. 619; W. & A. 342.

Deccan, in dry Districts, Bellary (Gamble), apparently on black cotton soil.

A trailing very scabrous plant with subglobose spinous fruit striped green and white.

Cucumis Melo, Linn., the Melon, is largely cultivated on the sandy beds of rivers when the stream has subsided to its hot season channel. Vern. *Hind.* Kharboj.

Cucumis sativus, Linn., the Cucumber, is grown in gardens as a vegetable. Vern. *Hind.* Khira.

7. *Citrullus*, Neck.

Trailing herbs, hispid or scabrous; tendrils 2-3-fid. *Leaves* triangular-ovate, deeply 3-5-lobed, the midlobe elongate, all sinuately pinnatifid. *Flowers* monoecious, yellow, both ♂ and ♀ solitary, rather large. *Calyx*-tube broadly campanulate, lobes 5. *Corolla* usually rotate, the petals ovate or obovate, obtuse or emarginate. *Stamens* 3; filaments short, free; anthers free or slightly cohering, 1 1-celled, 2 2-celled, the cells linear flexuous, the connective not produced; in ♀ flowers staminodes 3, setiform or ligulate. *Ovary* ovoid, 1-celled; ovules many on 3 vertical placentas; style short; stigmas 3, thick, reniform; in ♂ flowers pistillode glandular. *Fruit* a globose or oblong fleshy, or dry, indehiscent berry. *Seeds* very many, elliptic-oblong, compressed, smooth.

Perennial; fruit globose, up to 3 in. in diam., very bitter; leaf-lobes narrow, thick.....1. *Colocynthis*.

Annual; fruit oblong or ellipsoid, up to 10 in. in diam., edible; leaf-lobes broad, thin*vulgaris*.

CITRULLUS COLOCYNTHIS, Schrad.; F. B. I. ii. 620; Wt. Ic. t. 498. *Cucumis Colocynthis*, Linn.; W. & A. 342.

Deccan, on dry sandy or stony lands.

A trailing scabrid herb with much cut leaves and globular fruit variegated dark-green and white, the pulp of which affords an important purgative medicine. Vern. *Hind.*

Indrawan; *Tel.* Patsa kaya.

C. vulgaris, Schrad., is the Water Melon, sometimes grown on the sandy beds of rivers for its refreshing fruit. It comes from Tropical Africa. Vern. *Hind.* Tarbuj.

8. *Coccinia*, W. & A.

Slender scandent or prostrate herbs; roots sometimes tuberous; tendrils simple. *Leaves* petiolate, deltoid or subrotund, angled or lobed, sometimes glandular beneath. *Flowers* rather large, white or yellow, dioecious, ♂ solitary or subcymose, ♀ solitary. *Calyx*-tube campanulate, short; lobes 5. *Corolla* campanulate, shortly 5-fid. *Stamens* 3; filaments connate in a column, rarely free; anthers connate, 1 1-celled, 2 2-celled, cells conduplicate; in ♀ flowers staminodes 3, oblong or subulate. *Ovary* ovoid,

oblong or linear; ovules very many, horizontal, from 3 placentas; style slender; stigmas 3; pistillode in ♂ flowers 0. *Fruit* an ovoid or oblong indehiscent berry. *Seeds* ovoid, compressed, margined, the testa smooth velvety or scorbiculate.

COCCINIA INDICA, W. & A. 347; Wt. Ill. t. 105. *Cephalandra indica*, Naud.; F. B. I. ii. 621.

Most plains Districts, especially in the Deccan and Carnatic, on hedges and bushes.

A pretty climber with large white flowers and oblong scarlet fruit with velvety seeds, the leaves variable, generally 5-angled with shallow sinuses, but sometimes even on the same plant (var. *palmeta*, W. & A.) deeply 5-lobed. The fruit is sometimes eaten. Vern. *Hind.* Bhimb; *Tel.* Kaidonda; *Tam.* Kovay.

9. Meloethria, Linn.

Slender scandent or prostrate herbs, annual or with a perennial root stock; tendrils simple, rarely bifid. *Leaves* usually membranous, entire or lobed. *Flowers* small, monoecious or dioecious, yellow or white; ♂ in racemes, corymbs or umbels, sometimes fascicled, rarely solitary; ♀ solitary fascicled or in umbels. *Calyx* campanulate; lobes 5. *Corolla* deeply 5-partite, the lobes entire. *Stamens* 3, inserted on the tube, rarely at the base, of the calyx; filaments free; anthers free or slightly cohering, 1 1-celled the others 2-celled, or all 2-celled, the cells straight or curved, the connective sometimes produced; in ♀ flowers staminodes 3 or 0. *Ovary* ovoid globose or fusiform, constricted below the flower; ovules usually many, on 3 placentas; style short, surrounded by an annular disk; stigmas 3, rarely 2; in ♂ flowers pistillodes globose or annular. *Fruit* a globose ovoid or fusiform berry, many- or few-seeded. *Seeds* ovoid or subglobose, usually compressed and margined, smooth or rugose.

Flowers usually monœcious, ♂ in racemes, ♀ solitary; anthers subsessile; leaves deltoid, acute or acuminate, up to 2 in. long, 2-2.5 in. broad, membranous, punctate; fruit fusiform, rostrate; seeds smooth, truncate at base, not marginate.....1. *zeylanica*. Flowers monœcious or dioecious, ♂ usually umbellate, ♀ solitary or umbellate; filaments long, the connective not produced:—

Seeds small, much compressed; leaves membranous, simple or 3-5-lobed:—

Flowers monoecious; leaves usually rufous-villous beneath, the teeth very short; berry globose, .25 in. in diam.; seeds smooth, faintly marginate 2. *perpusilla*.

Flowers dioecious; leaves nearly glabrous beneath, the teeth triangular; berry oblong, .6 in. long, .3 in. broad; seeds marginate 3. *mucronata*.

Seeds large, globose, scarcely compressed; leaves subcoriaceous, variable in shape:—

Flowers dioecious; leaves cordate, ovate or 3-5-lobed or hastate, the lobes sometimes long, prominently nerved; fruit oblong, ribbed, up to 2.5 in. long; seeds smooth on the faces, the broad ring rugose 4. *heterophylla*.

Flowers monoecious; leaves deeply cordate or sagittate, not lobed though often angulate, prominently nerved; fruit ovoid, beaked, up to 1 in. long; seeds smooth on the faces, nearly so on the flat ring 5. *amplexicaulis*.

Flowers monoecious, ♂ fascicled, ♀ solitary; anthers subsessile, the connective apiculate; fruit small, globose, subsessile; seeds marginate, slightly flattened, .15 by .1 in.; leaves and stems more or less scabrous:—

Seeds smooth on the faces; leaves beneath densely softly villous-tomentose 6. *leiosperma*.

Seeds rugose on the faces; leaves beneath shortly hirsute or scabrous 7. *maderaspatana*.

1. *MELOTHRIA ZEYLANICA*, C. B. Clarke in F. B. I. ii. 626.

W. Gháts, in Wynaad and Pulney Hills, at about 3,000 ft.

A pretty, very slender climber, the flowers and fruit on long slender pedicels.

2. *MELOTHRIA PERPUSILLA*, Cogn. *Zehneria Hookeriana*, Arn.; F. B. I. ii. 624. *Bryonia Hookeriana*, W. & A. 345. *B. maysorensis*, Wt. Ic. t. 758.

Deccan, Horsleykonda at 4,000 ft. (Fischer); W. Gháts, in the Nilgiris and Pulneys, up to 6,000 ft.; Shevaroy Hills of Salem.

A slender climber with small globose berries, red when ripe, and greenish-yellow flowers. The var. *subtruncata*, Cogn., has the leaves nearly truncate at base.

3. *MELOTHRIA MUCRONATA*, Cogn. *Zehneria Baueriana*, C. B. Clarke; F. B. I. ii. 624. *Bryonia maysorensis*, W. & A. 345; Wt. Ic. t. 1609 (but not dioecious).

W. Gháts, in the Nilgiris, Pulneys and Sirumalai Hills, up to 7,000 ft.

A slender climber with oblong berries, apparently yellow when ripe.

4. MELOTHRIA HETEROPHYLLA, Cogn. *Zehneria umbellata*, Thw.; F. B. I. ii. 625 *in part*. *Bryonia umbellata*, Klein; W. & A. 345.

E. Gháts, Madgol Hills of Vizagapatam, at 5,000 ft.; Deccan, in the hills; W. Gháts, at low levels and up to 5,000 ft. W. Coast, from S. Canara southwards.

A climber from a perennial root, with polymorphic leaves and large fruit, red and often yellow-spotted or -striped when ripe, the small flowers yellowish-white.

5. MELOTHRIA AMPLEXICAULIS, Cogn. *Bryonia amplexicaulis*, W. & A. 346; Wt. Ic. t. 502.

Deccan, Carnatic and W. Coast, not common.

A climber with more or less amplexicaul coriaceous leaves and scrobiculate seed, very nearly allied to and difficult to distinguish from the preceding species.

6. MELOTHRIA LEIOSPERMA, Cogn. *Mukia leiosperma*, Wt.; F. B. I. ii. 623. *Bryonia leiosperma*, W. & A. 345.

W. Gháts, in the Nilgiris and Pulneys, up to 6,000 ft.

A hispid, very villous small climber.

7. MELOTHRIA MADERASPATANA, Cogn. *Mukia scabrella*, Arn.; F. B. I. ii. 623. *Bryonia scabrella*, Linn. f.; Wt. Ic. t. 501.

Most Districts of the Deccan, Carnatic and lower hills of W. Gháts.

A scabrous climber with small yellow flowers, the berries red when ripe, the leaves variable in shape.

10. Blastania, Kotschy & Peyr.

Prostrate or scandent annual herbs, drying black; tendrils simple. *Leaves* digitately 5-7-lobed or -partite; in each axil a broad, rounded, stipuliform, pectinate bract. *Flowers* minute, monoecious, ♂ racemose, on slender pedicels; ♀ solitary in the same axils. *Calyx*-tube short, campanulate; lobes 5, very small, subulate. *Corolla* rotate, deeply 5-partite. *Stamens* 3, inserted on the calyx-tube, free; anthers small, 1 1-celled, the rest 2-celled, the cells short, straight, connective not produced; staminodes

in ♀ 0. *Ovary* ovoid; ovules few, horizontal, on 2-3 placentas; style columnar; stigmas 2, rarely 3; pistillode in ♂ flowers 0. *Fruit* a fleshy globose or subquadrate berry. *Seeds* usually 2 or 3, marginate, obovate, hollowed on one side, convex on the other, the testa smooth.

BLASTANIA GARCINI, Cogn. *Ctenolepis Garcini*, Hook. f.; F. B. I. ii. 629. *Bryonia Garcini*, Willd.; W. & A. 344.

N. Circars, Deccan and Carnatic, extending westwards to the Gháts.

A slender pretty annual climber with orange or red fruit.

11. *Kedrostis*, Medikus.

Prostrate or scandent herbs, with a perennial rootstock; tendrils simple. *Leaves* entire or lobed, dentate or partite. *Flowers* small, yellow or greenish, monoecious, rarely dioecious; ♂ racemose or corymbose; ♀ solitary or aggregated, shortly pedicelled. *Calyx*-tube campanulate; lobes 5, short. *Corolla* rotate, 5-partite. *Stamens* 3, rarely 5, inserted in the calyx-tube; filaments short; anthers short, 1 1-celled, the others 2-celled or all 1-celled if 5; cells straight or curved; connective produced above the cells, usually bifid; staminodes in ♀ 0 or 3, very small. *Ovary* ovoid, beaked, with 2-3 placentas; ovules few; style sometimes surrounded by a disk; stigmas 2 or 3; pistillode in ♂ 0 or glandular. *Fruit* an ovoid, usually rostrate berry. *Seeds* few, tumid, marginate, testa smooth.

KEDROSTIS ROSTRATA, Cogn. *Rhynchocharpa foetida*, C. B. Clarke; F. B. I. ii. 627. *Bryonia rostrata*, Rottl.; W. & A. 346. Carnatic (Wight, Rottler).

A prostrate or scandent herb with orbicular or reniform leaves, small flowers and an ovoid, beaked, red fruit.

12. *Corallocarpus*, Welw.

Prostrate or climbing herbs; tendrils simple. *Leaves* roundish-cordate, lobed or palmate, rather thick. *Flowers* minute, monoecious, ♂ in small crowded racemes on long peduncles, ♀ solitary short-peduncled from the same axils. *Calyx*-tube campanulate; lobes 5, short. *Corolla* 5-partite; lobes ovate. *Stamens* 3, free, inserted on the calyx-tube; filaments very short; anthers all

2-celled or 1 1-celled, the cells straight, lateral on the thin connective, which is often produced and sometimes bifid above; in ♀ staminodes 0 or minute. *Ovary* ovoid, beaked, 2-3-celled; ovules few, on 2-3 placentas; style straight, without disk; stigma 3-, rarely 2-4-lobed; in ♂ flowers pistillode minute. *Fruit* an ovoid usually beaked fleshy berry, circumsciss near the base. *Seeds* few obovoid or subglobose, often appressed-pilose, very little compressed.

Peduncles of ♀ flowers thickened, also of ♂, which reach 3 in. long; tendrils stout; leaves rather thick, deeply 3-5-lobed 1. *epigaeus*. Peduncles of ♀ flowers very slender, also of ♂, which reach 1-5 in. long; tendrils capillary; leaves thin, 3-lobed 2. *gracilipes*.

1. CORALLOCARPUS EPIGAEUS, Hook. f.; F. B. I. ii. 628.

Bryonia epigaea, Rottl.; W. & A. 346; Wt. Ic. t. 503.

Deccan and Carnatic and westward to the lower hills of the Ghâts, in dry country.

A thick-stemmed climber from a large tuberous rootstock, the leaves rough and variable in their lobes, the fruit scarlet in the middle, the base and beak green.

2. CORALLOCARPUS GRACILIPES, Cogn. Monog. 650.

Carnatic, Near Pondicherry (Lépine).

A very slender climber.

13. Cerasiocarpum, Hook. f.

Climbing glabrous herbs; tendrils simple. *Leaves* oblong, cordate at base, entire or hastately 3-lobed. *Flowers* small, monoecious; ♂ in racemes; ♀ solitary, often from the same axils. *Calyx*-tube campanulate; lobes 5, minute. *Corolla* rotate, 5-partite, the lobes ovate. *Stamens* 3, free, inserted on the mouth of the calyx-tube; filaments very short, broad; anthers 1 1-celled, 2 2-celled; cells oblong, lateral on the connective, which is membranous and often produced; staminodes in ♀ 0. *Ovary* ovoid, 1-celled, with 2-3 placentas; ovules 4-6; style columnar; stigma 3-lobed; in ♂ pistillode 0. *Fruit* a depressed globose smooth fleshy indehiscent berry. *Seeds* 2-6 broadly ovoid, not compressed, marginate, surrounded by orange pulp.

CERASIOCARPUM BENNETTII, Cogn. *C. zeylanicum*, Hook. f.; F. B. I. ii. 629; Trim. Fl. Ceyl. t. 44.

W. Gháts, in S.-E. Wynaad, near Devala, at 3,000 ft. (Gamble).

A pretty climber with membranous leaves up to 5 in. long, 2·5 in. broad, dentate and acuminate, sometimes hastate at base, the fruit bright orange-red.

14. *Gynostemma*, Blume.

Slender climbing herbs; tendrils simple. *Leaves* pedately 3-7-foliolate, leaflets ovate-lanceolate. *Flowers* minute, white or greenish, dioecious or rarely monoecious, in diffuse axillary panicles; pedicels articulate, bracteolate. *Calyx* rotate, 5-partite; lobes short. *Corolla* rotate, 5-partite; lobes lanceolate. *Stamens* 5, inserted at the bottom of the calyx; filaments connate in a column below; anthers 2-celled; staminodes in ♀ 0. *Ovary* spherical, 2-3-celled; ovules 2 in each cell, pendulous; styles 2-3, bifid at tip; pistillodes in ♀ 0. *Fruit* a globose, indehiscent, 1-3-seeded berry. *Seeds* ovoid or triangular, flattened, verrucose.

GYNOSTEMMA PEDATA, Blume; F. B. I. ii. 633; Trim. Fl. Ceyl. t. 45.

W. Gháts, Nilgiri Hills at 4,000-6,000 ft.; hills of Tinnevely (Beddome).

A slender climber with long flower- and fruit-panicles, the leaflets vine-like, crenate-serrate, the berry greenish.

15. *Zanonia*, Linn.

Scandent shrubs; tendrils simple or bifid at the apex. *Leaves* petiolate, ovate or oblong, entire. *Flowers* small, dioecious, all racemose or the ♂ paniced. *Calyx* of 3, rarely 4, sepals, broadly oblong or orbicular, membranous, concave. *Corolla* rotate, 5-partite, coriaceous or fleshy; lobes narrowed at the apex. *Stamens* 5, free, inserted on a fleshy disk; filaments very short and thick; anthers transversely oblong, 1-celled; staminodes in ♀ short, alternate with the petals. *Ovary* elongate, at first 3-celled, later 1-celled by absorption of the septa; ovules 2-many in each cell, on parietal placentas, pendulous; styles 3, bifid at apex; pistillode in ♂ 0. *Fruit* cylindric clavate or hemispheric, terete or subtrigonus, truncate and broadly 3-valved at apex. *Seeds* large, pendulous, oblong, compressed, imbricate, surrounded by a broad membranous wing.

ZANONIA INDICA, Linn.; F. B. I. ii. 633; W. & A. 340; Wt. Ill. t. 103 (but not monoecious).

W. Gháts, in the Bababudan Hills of Malabar.

A stout climbing shrub with large ovate-cordate leaves and winged seeds.

Lagenaria vulgaris, Ser., is the Bottle Gourd, cultivated for its fruit, which has various shapes and is eaten when young, and when old and the shell has dried used for bottles and to make musical instruments. Vern. *Hind.* Kaddu.

Benincasa cerifera, Savi, is the White Gourd Melon, occasionally cultivated for its fruit, which is large and fleshy and covered with a waxy bloom. The seeds, which are compressed and marginate, yield an oil. Vern. *Hind.* Gol kaddu.

Cucurbita maxima, Duch., the Squash-Gourd, *C. Pepo*, DC., the Pumpkin, *C. ovifera*, Linn. the Vegetable Marrow, and *C. moschata*, Duch., the Musk Melon, are all large-fruited large climbing or trailing herbs cultivated for their fruits.

Family LXXIV. DATISCACEAE.

Trees or herbs. *Leaves* petioled, simple or pinnate, alternate; stipules 0. *Flowers* small, regular, dioecious or rarely bisexual, in fascicles racemes or panicles. *Calyx*-tube in ♂ short; in ♀ adnate to the ovary; lobes 3-9. *Petals* 0. *Stamens* 4 or more, usually opposite the calyx-lobes; filaments short; anthers 2-celled, in ♀ if present reduced to staminodes. *Ovary* 1-celled, open or closed at the apex; placentas parietal; ovules numerous, ascending or horizontal; styles as many as the placentas and alternate with them, simple or 2-partite. *Fruit* a coriaceous or membranous capsule, dehiscing at the apex between the styles. *Seeds* very many, minute; albumen scanty; embryo straight.

Tetrameles, R. Br.

Large tree. *Leaves* deciduous, ovate, acuminate, pubescent beneath. *Flowers* dioecious, appearing before the leaves; ♂ in panicles, ♀ in racemes, clustered near the ends of the branches. *Calyx*-tube in ♂ very short, in ♀ connate with the ovary; lobes 4. *Stamens* 4, opposite the calyx-lobes, inserted round a flat central disk. *Ovary* inferior, 1-celled; ovules numerous on 4 parietal placentas; styles 4, subulate; stigmas club-shaped.

Capsule ovoid, membranous, 4-8-ribbed, dehiscing at the apex. *Seeds* very many, minute, ellipsoid; testa very loose, reticulate, membranous.

TETrameLES NUDIFLORA, R. Br.; F. B. I. ii. 657; Bedd. Fl. t. 212. *T. Grahamiana*, Wt. Ic. t. 1956.

W. Coast and W. Gháts, in low level forests both evergreen and deciduous, up to 2,500 ft.

A very large deciduous tree reaching 150 ft. in height and a considerable diameter, the base supported by large buttresses. Bark greyish-white, smooth; wood coarse and soft, largely used on the W. Coast for dug-out canoes. Vern. *Tam.*, *Mal.* Chini.

Family LXXV. BEGONIACEAE.

Succulent herbs, sometimes undershrubs; stem often reduced to a rhizome or tuber. *Leaves* alternate, rarely subverticillate, more or less inequilateral, entire toothed or lobed; stipules 2, free, often deciduous. *Flowers* usually showy, white rose or yellow, monoecious, on axillary peduncles bracteate at base, divided above in dichotomous cymes; bracts and bracteoles opposite. MALE: Perianth of 2 outer valvate *sepals* with or without an inner smaller pair; *stamens* numerous, the filaments free or connate in a bundle; anthers usually narrowly obovoid, 2-celled, dehiscing longitudinally. FEMALE: Perianth of 2-6 sepals, the 2 outer usually large; *ovary* inferior, 2-4-celled, usually 3-celled and -winged; *placentas* axile, simple or 2 in each cell; ovules numerous; styles 2-4, free or connate; stigmas branched or twisted. *Fruit* a capsule, usually winged, variously but usually loculicidally dehiscent. *Seeds* minute; testa reticulate; albumen scanty or 0.

Begonia, Linn.

CHARACTERS OF THE FAMILY.

Placentas 2 in each cell; small plants with tuberous roots:—

Capsule 3-celled; sepals of ♂ flowers 4, the outer larger:—

Ovary pubescent; leaves ovate, cordate, acuminate; capsule-wings 3, elongate, one especially so, ascending; stigmas spiral

1. *picta*.

Ovary glabrous; leaves orbicular, cordate; capsule-wings 3, narrow, horizontal, sub-equal; stigmas branched, curved

2. *cordifolia*.

Capsule 2-celled; sepals of ♂ flowers 4, the outer larger:—

Stem succulent, rather stout; leaves up to 6 in. long, ovate, unequally often not deeply cordate, nearly entire, acute; capsule-wings 1 broad descending, 2 narrow; stigmas twisted

3. *integrifolia*.

Stems very slender, scarcely 6 in. long; leaves small, membranous:—

Capsule-wings subequal, triangular, ascending; stigmas reniform, papillose; outer sepals of ♂ orbicular, broad; leaves unequally cordate, up to 2 in. in diam. 4. *crenata*.

Capsule-wings narrow, one much longer and broader than the other 2, horizontal; stigmas 3-5-lobed, capitate; sepals of ♂ flowers obovate, narrow; leaves equally cordate, about 1 in. in diam. 5. *canarana*.

Placentas undivided:—

Stemless scapigerous herbs:—

Leaves peltate, reniform-orbicular, broader than long, entire, ciliate; scape longer than the leaves; sepals of ♂ flowers 4, outer slightly larger than inner; capsule-wings equal and equally broad (·2 in.), prominently reticulate 6. *albo-coccinea*.

Leaves deeply cordate at base but not peltate:—

Leaves ovate, coarsely serrate, often lobed, acute, pilose, very membranous; scape slender, as long as the leaves; sepals of ♂ flowers 4, orbicular, inner narrow; capsule-wings subequal, broader above (about ·15 in.) and truncate. 7. *subpeltata*.

Leaves orbicular, broader than long, distinctly dentate, white-tomentose beneath, thick; scape elongate, many-flowered; sepals of ♂ flowers 2 only; capsule-wings subequal, broadest at the middle (·2 in.) 8. *floccifera*.

Stems elongate, leaf-bearing; leaves ovate, acute, serrate, sparsely pubescent, membranous; flowers large; sepals of ♂ flowers 4, outer much larger than the obovate inner, anthers long; capsule at first hispid, the wings subequal, ascending, broadest at top (·3-·4 in.)

9. *trichocarpa*.

Almost shrubby, the stems thick, jointed, leafy, the flowers on axillary peduncles; sepals in ♂ and ♀ 2 only, orbicular; leaves very unequally ovate-cordate, acuminate, serrate; capsule-wings subequal, rounded or slightly angled near the top where broadest, occasionally slightly acute at top 10. *malabarica*.

1. *BEGONIA PICTA*, Sm.; F. B. I. ii. 638.

N. Circars, hills of Ganjam (Gamble).

A slender plant of shady banks, the flowers pale rose, the leaves variegated.

2. *BEGONIA CORDIFOLIA*, Thw.; F. B. I. ii. 641. *Diploclinium Arnottianum* and *cordifolium*, Wt. Ic. tt. 1815, 1816.

W. Gháts, in forests from Malabar to Tinnevely.

A scapigerous herb with pink flowers and variegated leaves.

3. *BEGONIA INTEGRIFOLIA*, Dalz.; F. B. I. ii. 648.

W. Gháts, in the hills from Canara and Mysore to Wynaad.

A short-stemmed succulent herb with white flowers.

4. *BEGONIA CRENATA*, Dryand.; F. B. I. ii. 651. *B. minima*, Bedd. Ic. t. 110.

W. Gháts, from Mysore to Wynaad, at low levels.

A slender herb with small pale pink flowers.

5. *BEGONIA CANARANA*, Miq.; F. B. I. ii. 652.

W. Coast and W. Gháts, from S. Canara (Hohenacker) to Malabar and Wynaad, up to 3,000 ft.

A very slender herb with small flowers.

6. *BEGONIA ALBO-COCCINEA*, Hook.; F. B. I. ii. 654. *B. Grahamiana*, Wt. Ic. t. 1811.

W. Gháts, in the hills of Tinnevely about Courtallum.

A scapigerous succulent herb with rose-coloured flowers, rather large peltate leaves, and large membranous stipules at the base.

7. *BEGONIA SUBPELTATA*, Wt. Ic. t. 1812; F. B. I. ii. 653.

W. Gháts, probably in Malabar (Wight).

A very slender herb with membranous leaves.

8. *BEGONIA FLOCCIFERA*, Bedd. Ic. t. 111; F. B. I. ii. 654.

W. Gháts, hills of Travancore and Tinnevely, at 3000 ft. (Beddome).

A rather large herb with woolly leaves and tall many-flowered scapes.

9. *BEGONIA TRICHOCARPA*, Dalz.; F. B. I. ii. 653.

W. Gháts, Bababudan Hills of Malabar (Law).

A large fleshy herb with white flowers and large basal stipules.

10. *BEGONIA MALABARICA*, Lamk.; F. B. I. ii. 655. *B. dipetala*, Grah.; Wt. Ic. t. 1813. *Diploclinium Lindleyanum*, Wt. Ic. t. 1817.

W. Gháts, in the Nilgiri, Anamalai and Pulney Hills, up to 6,000 ft., in moist woods.

A large almost shrubby much-branching succulent plant with many rose-coloured flowers and large capsule, common and conspicuous. The shape of the capsule-wings is variable: sometimes they are pointed at apex, sometimes truncate, but more usually rounded.

B. anamalayana, Bedd., in Trans. Linn. Soc. xxv. 217 is a scapigerous herb with very oblique reniform leaves, the younger very floccose, the older glabrous. The scape is many-flowered, much longer than the leaves, and both ♂ and ♀ flowers have only 2 sepals. Anamalai Hills, in moist forests, at 3,000 ft.

Family LXXVI. CACTACEAE.

Herbs, shrubs or trees with usually succulent stems; branches often thickened, striated or angled. *Leaves* usually represented by tufts of spines or by prickles or small tubercles; stipules 0. *Flowers* regular, hermaphrodite, solitary. *Calyx*-tube adnate to the ovary; lobes 3-many, small, imbricate. *Petals* many, free or shortly united at base, imbricate. *Stamens* very many, free or adnate to the base of the petals; filaments filiform; anthers small. *Ovary* 1-celled; ovules very many, horizontal, on parietal placentas; style terminal, simple, filiform or cylindric; stigma 2-many-rayed. *Fruit* a 1-celled berry with pulpy placentas. *Seeds* very many, oblong or reniform; albumen copious scanty or 0; embryo straight or curved; cotyledons free or connate.

Opuntia, Mill.

Shrubs, with woody stems; branches jointed, the joints fleshy, flattened, ovate, tubercled, the tubercles hirsute and spiny. *Leaves* on youngest joints small, scale-like, deciduous; on older ones represented by spines. *Flowers* lateral, showy, yellow orange or red. *Calyx*-tube bearing small outer lobes adnate to the ovary, the inner lobes at its mouth. *Petals* many, spreading, connate below. *Stamens* very numerous, in many series. *Ovary* of many connate carpels; ovules many; style cylindric; stigmas many, thick, erect. *Fruit* a pear-shaped, fleshy, tubercled berry. *Seeds* compressed; testa very hard, albuminous cotyledons leaf-like.

ANALYSIS, AFTER I. H. BURKILL IN RECORDS BOT. SURVEY
INDIA, IV.

Stamens exserted; flowers rose-coloured; spines 0...1. *coccinellifera*.
Stamens not exserted:—

Spines falling except one long one on each cushion; flowers yellow,
the sepals and petals tinged with red.....2. *monacantha*.
Several large spines remaining on each cushion:—

Spines all straight, slender, tawny or purplish-black; flowers at
opening lemon-yellow, changing to rose-pink.....3. *elatio*r.

Spines some curved, the largest stout, light horn-coloured in
life, darkening afterwards; flowers yellow.....4. *Dillenii*.

1. *OPUNTIA COCCINELLIFERA*, Mill.

Chingleput and Tinnevely Districts in Carnatic.

A Mexican species which is only occasionally found in
India and has apparently never spread itself widely; it
was introduced at Masulipatam in 1788 with the object of
acclimatizing the cochineal insect, for which it is suited.

2. *OPUNTIA MONACANTHA*, Haw.

N. Circars, common; Carnatic, about Madras; Deccan, in
Coimbatore.

A species which has spread widely in some localities and is
at once recognized by its single straight thorns. It was
introduced very early, certainly before 1786, probably from
Brazil.

3. *OPUNTIA ELATIO*R, Mill.

N. Circars, along the coast down to the Kistna river, also
near Madras; Deccan, about Bellary.

A common species, but frequently mistaken for the next, it
is recognized by its rose-pink flowers and was apparently
introduced about 1800.

4. *OPUNTIA DILLENII*, Haw.; F. B. I. ii. 657; W. & A. 363
excl. syn. Cactus indicus, Roxb.; Wt. Ill. t. 114.

E. Coast from Ganjam to Madras, often quite close to the
sea, inland also in various places; Deccan, in Bellary and
Mysore, the most common species, easily recognized by its
glaucous-green joints, yellow flowers, purple fruits and
curved thorns. It comes probably from the Californian
Peninsula and was introduced very early, and before 1786
it was established in Madras (Burkill). Many attempts
have been made to eradicate it, but unsuccessfully in

general. Its spread is chiefly due to its use as a hedge plant. Vern. *Hind.* Nagphana.

Family LXXVII. AIZOACEAE.

Annual or perennial herbs. *Leaves* simple, often fleshy, opposite alternate or falsely whorled; stipules scarious or 0. *Flowers* regular, hermaphrodite or rarely polygamous, in cymes or fascicles, rarely solitary. *Calyx* of 4-5 sepals, free or rarely adnate to the ovary, usually persistent. *Petals* usually 0, when present small. *Stamens* perigynous or hypogynous, definite or indefinite, sometimes with staminodes; filaments free or connate in a cup; anthers oblong. *Ovary* free, 2-5-celled, syncarpous or rarely apocarpous; ovules many in each carpel, axile or solitary basal; styles as many as the carpels. *Fruit* usually capsular, dehiscent loculicidally or circumscissily, sometimes of indehiscent cocci. *Seeds* many or 1 in each carpel, usually reniform, compressed; testa membranous or crustaceous, often pitted or tuberculate; albumen mealy, surrounded by the curved or annular embryo.

Fruit syncarpous:—

Calyx-tube elongate; stamens inserted on the calyx-tube; capsule circumsciss; petals 0:—

Ovary and capsule 3-5-celled 1. **Sesuvium.**

Ovary and capsule 1-2-celled 2. **Trianthema.**

Calyx deeply 5-partite; stamens hypogynous; capsule 3-5-celled, loculicidal:—

Petals many, small; seeds arillate.....3. **Orygia.**

Petals 0; seeds sometimes appendaged 4. **Mollugo.**

Fruit apocarpous; carpels 3-5, 1-seeded; petals 0.....5. **Gisekia.**

1. Sesuvium, Linn.

Herbs or undershrubs, erect or prostrate, branched, succulent. *Leaves* opposite, entire, fleshy; stipules 0 or the petioles connected by a stipuliform membrane. *Flowers* axillary, sessile or peduncled, solitary or clustered; bracteoles 2 or 0. *Calyx*-tube turbinate; lobes 5, lanceolate, persistent, coloured within, apiculate below the tip, hyaline on the margins. *Petals* 0. *Stamens* 5 or many, inserted round the top of the calyx-tube; filaments usually connate at base. *Ovary* free, 3-5-celled; ovules numerous on axile placentas; styles 3-5. *Fruit* an ovate membranous 3-5-celled,

circumscissile capsule, the axis and placentas persistent. *Seeds* many, reniform; testa smooth; embryo annular.

SESUVIUM PORTULACASTRUM, Linn.; F. B. I. ii. 659.

E. and W. Coasts, on sea-shore sand.

A fleshy prostrate rooting stout-stemmed herb, the sepals purplish, the styles 3, the seeds black, shining, leaves linear-oblongate or spatulate.

Var. *repens*, Rottl. *S. repens*, Wt. in Hook. Comp. Bot. Mag. ii. 71; W. & A. 361. Leaves much smaller, obovate-spatulate, stems more slender.

2. *Trianthema*, Linn.

Diffuse prostrate branched herbs, glabrous or papillose. *Leaves* petioled, opposite, unequal, entire, subfleshy, the petioles of each pair connected at the base by stipuliform membranes. *Flowers* small, axillary, sessile or peduncled, solitary or in cymes or clusters; bracts membranous as are the 2-bracteoles. *Calyx*-tube short or long; lobes 5, coloured within, mucronate on the back near the tip. *Petals* 0. *Stamens* 5, 10 or 15, inserted near the top of the calyx-tube. *Ovary* free, sessile, usually truncate at apex, 1-2-celled; ovules 1 or more in each cell, from a basal placenta; styles 1 or 2, papillose. *Fruit* a capsule, circumsciss, the upper part carrying away 1-2 seeds, the lower 2-many-seeded. *Seeds* 1 or more, reniform, rough; embryo annular.

Style 1:—

Flowers solitary, sessile, sheathed by the base of the petiole; stamens 10 or 15; leaves obovate; capsule-top mitriform enclosing at least 1 seed, the lower part 3-5-seeded; seeds with concentric muriculate lines.....1. *Portulacastrum*.

Flowers fascicled, nearly sessile, not enclosed in the base of the petiole; stamens 5; leaves oblong or elliptic; capsule-top an annular depressed cushion enclosing 1 seed, the lower part also 1-seeded; seeds with concentric smooth lines2. *triquetra*.
 Styles 2; flowers in clusters of dichasioid cymes; stamens 10 or 15; leaves elliptic or elliptic-oblong; capsule-top truncate with an annular rim enclosing 2 seeds, the lower part also 2-seeded; seeds with concentric muriculate lines3. *decandra*.

1. TRIANTHEMA PORTULACASTRUM, Linn. *T. monogyna*, Linn.; F. B. I. ii. 660. *T. obcordata*, Roxb.; W. & A. 355; Wt. Ic. t. 288.

Most plains Districts, a weed of roadside and waste lands.

2. *TRIANTHEMA TRIQUETRA*, Rottl. *T. crystallina*, W. & A. 355; F. B. I. ii. 660, *not of* Vahl.

Coast Districts of the Carnatic from Striharikota southwards, inland to Coimbatore.

Var. *oblongifolia*, Gamble. Leaves longer, up to .75 in., and broader; calyx-lobes with more acuminate and longer mucros.

S. Carnatic, at Tuticorin (K. Rangachari).

3. *TRIANTHEMA DECANDRA*, Linn.; F. B. I. ii. 661; W. & A. 355; Wt. Ic. t. 296.

Deccan and Carnatic, on dry-soil lands, common, a roadside weed.

3. *Orygia*, Forsk.

A diffuse branched glabrous herb. *Leaves* opposite and alternate, fleshy, entire, petioled; stipules 0. *Flowers* in terminal and leaf-opposed lax few-flowered cymes; bracts and bracteoles scarious. *Sepals* 5, ovate-cuspidate, the margins hyaline. *Petals* 0. *Stamens* numerous, inserted at the base of the calyx, subhypogynous; filaments filiform; staminodes many, connate at the base. *Ovary* globose, 5-celled; ovules many, axile; styles 5, filiform. *Fruit* a subglobose papery loculicidal capsule, surrounded by the persistent sepals; cells 5. *Seeds* many, reniform, compressed, strophiolate, with many concentric raised lines; embryo annular.

ORYGIA DECUMBENS, Forsk.; F. B. I. ii. 661. *Glinus trianthemoides*, Heyne; W. & A. 362; Wt. Ill. t. 113.

Deccan, in Hyderabad, Mysore and Coimbatore.

A branching herb with flowers in slender cymes, purple red staminodes (petals of Wight) and obovate cuspidate fleshy leaves.

4. *Mollugo*, Linn.

Branching, often dichotomous, herbs. *Leaves* often falsely whorled, or alternate, or radical and rosulate, entire, linear obovate or spathulate; stipules membranous, caducous. *Flowers* axillary, greenish, solitary fascicled or in cymes or racemes; bracts minute. *Sepals* 5, persistent. *Petals* 0. *Stamens* 3-5, subhypogynous, alternate with the sepals, often with staminodes

intermixed. *Ovary* free, globose or ovoid, 3-5-celled; ovules many in each cell, axile; styles 3-5, linear or small clavate. *Fruit* a membranous, oblong globose or subcylindric, capsule, dehiscence loculicidal. *Seeds* several in each cell, rarely 1, reniform, sometimes appendaged at the hilum; embryo annular.

Flowers in axillary fascicles; seeds appendaged and with a slender white thread curved round them:—

Leaves densely stellate-hairy, orbicular to obovate and spatulate; pedicels usually very short; sepals densely stellate hairy

1. *lotoides*.

Leaves glabrous or slightly crispate-pubescent, usually oblanceolate but sometimes almost orbicular; pedicels long, filiform; sepals glabrous.....2. *oppositifolia*.

Flowers in terminal cymes; seeds not or minutely appendaged, no curved thread:—

Leaves in whorls at the nodes:—

Cymes corymbosely branched; pedicels long, filiform:—

Leaves linear-lanceolate to obovate; stems quadrangular; seeds dark reddish-brown, shining, tuberculate...3. *pentaphylla*.

Leaves linear, very narrow; stems very slender, terete; seeds golden-brown, reticulate, not tuberculate.....4. *Cerviana*.

Cyme-branches lengthening into elongated racemes; pedicels short; leaves linear-lanceolate; stems angular; seeds golden-brown with flattened papillae, not tuberculate, the back furrowed

5. *disticha*.

Leaves all radical, spatulate; flower-peduncles many, erect, trichotomously branched; pedicels filiform; seeds reddish-black, covered with minute flattened tubercles.....6. *nudicaulis*.

1. MOLLUGO LOTOIDES, O. Kze. *M. hirta*, Thunb.; F. B. I. ii. 662. *Glinus lotoides*, Loefl.; W. & A. 362. *G. dictamnoides*, Linn.; W. & A. 362.

Deccan and Carnatic, in dry sandy places, and on waste lands, common.

A prostrate herb covered with stellate hairs, the leaves usually orbicular, the pedicels sometimes up to .75 in. long, but more usually very short.

2. MOLLUGO OPPOSITIFOLIA, Linn. *M. Spergula*, Linn.; F. B. I. ii. 662; W. & A. 44.

Deccan and Carnatic, in dry places and on waste lands and fallow fields, common.

A slender prostrate herb, the leaves eaten and used medicinally. Vern. *Tam.* Toora.

3. MOLLUGO PENTAPHYLLA, Linn. *M. stricta*, Linn.; F. B. I. ii. 663; W. & A. 44.

All plains Districts and at low elevations in the hills, a common weed.

An erect slender glabrous herb, the leaves very variable in shape.

4. MOLLUGO CERVIANA, Ser.; F. B. I. ii. 663; W. & A. 44.

Deccan and Carnatic, in sandy places, especially near the coast.

A very slender small glabrous herb, many branched from the base.

5. MOLLUGO DISTICHA, Ser.; F. B. I. ii. 663; W. & A. 44; Wt. Ic. t. 3.

East Coast, in sandy places not far from the sea.

An erect rather stout long-leaved herb, more or less crispate-pubescent.

6. MOLLUGO NUDICAULIS, Lam.; F. B. I. ii. 664; W. & A. 43.

Deccan and Carnatic, in dry places.

An erect annual herb with rosulate leaves.

5. Gisekia, Linn.

Diffuse branched herbs. *Leaves* opposite or falsely whorled, fleshy, spatulate, abounding in raphides; stipules 0. *Flowers* small, hermaphrodite or polygamous, in axillary fascicles or short cymes. *Sepals* 5, ovate, herbaceous with membranous margins, many white raphides. *Petals* 0. *Stamens* 5-15, hypogynous; filaments dilated at the base; anthers oblong. *Carpels* usually 5, distinct, sessile on a small torus, 1-celled; ovule 1 in each cell, basal; styles simple. *Fruit* of 5 free, membranous, white-papillose, indehiscent, 1-seeded carpels. *Seeds* vertical, compressed, subreniform; embryo annular.

GISEKIA PHARNACEOIDES, Linn.; F. B. I. ii. 664; Roxb. Cor. Pl. t. 183; Wt. Ic. t. 1167.

Deccan and Carnatic, from the Godavari southwards, on waste lands.

A diffuse usually prostrate herb with fleshy glaucous leaves and black minutely pitted seeds. Vern. *Tel.* Ishi-rash kura.

Family LXXVIII. UMBELLIFERAE.

Herbs, rarely shrubs or trees. *Leaves* usually alternate, simple or compound, the petiole generally sheathing at base; stipules 0 or rarely small and scarious. *Flowers* regular or irregular, hermaphrodite or polygamous, in compound, rarely simple, umbels, the outer flowers of the umbel sometimes radiant; umbels and umbellules each furnished with involucral bracts or bracteoles, which may sometimes be absent from one or both. *Calyx*-tube adnate to the ovary, limb 5-toothed or 0. *Disk* epigynous, 2-lobed. *Petals* 5, epigynous, sometimes unequal, often bifid, with an inflexed apex and a median fold. *Stamens* 5, epigynous, alternating with the petals. *Ovary* inferior, 2-celled, crowned by the disk; ovule solitary in each cell, pendulous; styles 2, often dilated at the base into stylopods; stigmas capitate. *Fruit* of 2 indehiscent dorsally or laterally compressed mericarps separated by a commissure and attached to and often pendulous from a slender forked carpophore; the mericarps usually marked by 5 longitudinal primary ridges, often alternating with secondary ones, the pericarp traversed by oil-canals (vittae). *Seed* 1 in each mericarp, pendulous; albumen cartilaginous; embryo minute, near the apex, the radicle superior.

Umbels simple; leaves orbicular, undivided; fruit laterally compressed; vittae 0:—

Mericarps with 3 ridges, the commisural obscure; flowers white; pericarp of seed thin 1. **Hydrocotyle**.

Mericarps with 7-9 ridges, the primary and secondary similar netveined between; flowers red; pericarp thick 2. **Centella**.

Umbels in groups of about 3, sessile in the axils of a cymose panicle; leaves 3-5-partite; fruit covered with hooked prickles; vittae many

3. **Sanicula**.

Umbels compound:—

Fruit laterally compressed:—

Leaves entire; flowers yellow or lurid; mericarp with 5 primary ridges, the secondary inconspicuous 4. **Bupleurum**.

Leaves usually pinnate or decompose; flowers white:—

Involucral bracts and bracteoles absent; umbels leaf-opposed
Apium.

Involucral bracts and bracteoles usually present:—

Furrows between the ridges usually with 1 vitta...5. **Carum**.

Furrows between the ridges 2-3-vittate.....6. **Pimpinella**.

Fruit widest at the commissure, circular or somewhat dorsally compressed in section; primary ridges distinct:—

Fruit globose, the ridges prominent; petals white 7. **Seseli.**

Fruit ovoid:—

Flowers yellow; leaves large with filiform segments

Foeniculum.

Flowers white; leaves small; vittae many:—

Bracts prominent 8. **Schultzia.**

Bracts none or small 9. **Polyzygus.**

Fruit dorsally compressed, the mericarps flattened, the lateral ridges winged:—

Wings of the mericarps with thick margins; vittae on the faces of the mericarps usually extending to the base; petals not radiant 10. **Peucedanum.**

Wings of the mericarps with thin margins; vittae usually not extending to the base; petals very often radiant

11. **Heracleum.**

Fruit subterete, not winged; secondary ridges of the mericarps prominent; petals radiant:—

Fruits glabrous; involucral bracts none **Coriandrum.**

Fruits setose; involucral bracts prominent, pinnate **Daucus.**

1. **Hydrocotyle**, Linn.

Prostrate herbs, rooting at the nodes, growing in moist places. *Leaves* orbicular or reniform, palmately lobed, long-petioled; stipules scarious. *Flowers* white, small, in simple small axillary sessile or pedicellate umbels; involucral bracts small or 0. *Calyx*-teeth none or very small. *Petals* entire, acute, valvate. *Fruit* laterally compressed, small; mericarps with 3 primary but without secondary ridges; vittae 0.

Leaves 1-3.5 in. in diam., 7-9-lobed; umbel-peduncles clustered, up to 2 in. long; mericarps very little compressed, the primary ridges obscure.....1. *javanica*.

Leaves 1-2 in. in diam., 7-9-lobed; umbels solitary, sessile or very shortly peduncled; mericarps slightly compressed, the primary ridges apparent 2. *conferta*.

Leaves 1-5 in. in diam., 7-lobed; umbel peduncles solitary, very slender, up to .75 in. long; mericarps compressed, the primary ridges angular3. *rotundifolia*.

1. *HYDROCOTYLE JAVANICA*, Thunb.; F. B. I. ii. 667. *H. polycephala*, W. & A. 366; Wt. Ic. t. 1003.
W. Gháts, in the Nilgiris and Pulneys, in shady places at high levels.
2. *HYDROCOTYLE CONFERTA*, Wt. Ic. t. 1002; F. B. I. ii. 668.
W. Gháts, in the Nilgiris and Pulneys, at high levels in wet places.
3. *HYDROCOTYLE ROTUNDIFOLIA*, Roxb.; F. B. I. ii. 668; Wt. Ic. t. 564. *H. tenella*, D. Don; W. & A. 366.
E. Gháts, hills of Vizagapatam, at 5,000 ft.; W. Gháts, in the Nilgiris and Pulneys, in bogs and on bare wet soil, up to 7,000 ft.

2. *Centella*, Linn.

Prostrate herbs, rooting at the nodes. *Leaves* orbicular, crenate, palmately nerved, deeply cordate with an angular sinus, long-petioled; stipules scarious. *Flowers* reddish, small, sessile, in simple axillary few-flowered umbels; involucral bracts 2, small. *Calyx* truncate. *Petals* minute, ovate, acute, imbricate. *Fruit* laterally compressed, the mericarps with about 7-9 subsimilar ridges, the secondary ridges as prominent as the primary, reticulate between them, vittae 0; pericarp thickened.

CENTELLA ASIATICA, Urban. *Hydrocotyle asiatica*, Linn.; F. B. I. ii. 669; W. & A. 366; Wt. Ic. t. 565.

All plains Districts in wet places, the borders of ricefields, and on banks, up to 6,000 ft. in the hills.

A common trailing and rooting weed with leaves up to 2 in. in diam., orbicular-cordate with rather shallow sinus.

3. *Sanicula*, Linn.

Erect herbs. *Leaves* deeply 3-5-partite, the segments again lobed and mucronate-serrate, chiefly radical and long-petioled. *Flowers* very small, mostly unisexual, in groups of about 3 umbels, sessile in the forks and on the branches of a cymose panicle, the bracts sessile, leaf-like; umbellules usually small, few-flowered, with few bracteoles. *Calyx*-lobes herbaceous, lanceolate. *Petals* white, with long incurved points. *Disk* flattened, thickened round the filiform styles. *Fruit* ovoid, not compressed, the mericarps

thickly covered with hooked spiny prickles, without ridges, vittae many.

SANICULA EUROPAEA, Linn.; F. B. I. ii. 670. *S. elata*, Ham.; W. & A. 367; Wt. Ill. t. 117, fig. 2; Wt. Ic. tt. 334, 1004.

W. Gháts, in the Nilgiris and Pulneys above 6,000 ft., in Sholas and similar shady places.

A perennial herb of wide distribution but variable, the S. Indian form having the leaves acuminate lobed.

4. Bupleurum, Linn.

Glabrous herbs or shrubs. *Leaves* entire. *Flowers* small, yellow or lurid, in compound umbels; involucral bracts and bracteoles usually present. *Calyx*-lobes 0. *Petals* 5, obovate, inflexed, the apex emarginate. *Disk* broad, flat. *Styles* short. *Fruit* laterally compressed, slightly constricted at the commissure; mericarps subpentagonal, primary ridges distinct, sometimes almost winged, secondary 0 or obscure; vittae 1-3 in the furrows between the primary ridges; carpophore 2-fid or 2-partite. *Seed* terete, sometimes slightly grooved on the inner face.

Erect, usually single-stemmed shrub up to 6 ft. high; lower leaves up to 6 in. long, cauline shorter, obtuse, all mucronate; bracts and bracteoles broad; mericarps 3-4 in. long with 5 corky ridges shortly winged; vittae 1 in each furrow between them ...1. *plantaginifolium*. Erect perennial herbs up to 3 ft. high or even more; bracts and bracteoles narrow, 3-nerved; mericarps semi-ellipsoid, 5-ridged:—

Leaves linear-oblong, obtuse at apex and mucronate, usually 1-3 in. long, 3 in. broad; mericarps with 1-3 vittae in the furrows

2. *mucronatum*.

Leaves linear, acute at apex and mucronate, up to 4 in. long, 25 in. broad; mericarps with usually 3 vittae in the furrows ...3. *virgatum*.

Erect slender perennial herb up to 1 ft. high; lower leaves crowded near the base, upper few, all linear mucronate; bracts and bracteoles lanceolate, hair-pointed; mericarps semi-ovoid, 1 in. long with distinct ridges; vittae 1 in each furrow, sometimes 3 at commissure

4. *distichophyllum*.

1. BUPLEURUM PLANTAGINIFOLIUM, Wt. Ic. t. 281; F. B. I. ii. 674.

W. Gháts, in the Shola Forests of the Nilgiris, above 6,000 ft.

A shrub, often with a single stem up to 6 ft. high, the stem marked by the round scars of fallen leaves. Basal leaves long and narrow with very oblique subparallel nerves; cauline leaves shorter and broader and very obtuse.

2. *BUPLEURUM MUCRONATUM*, W. & A. 370; F. B. I. ii. 676, *in part*.

W. Gháts, in the Nilgiris at about 7,000 ft., among bushes, scarce in Pulneys.

A bushy plant with knotted stems and many leaves, the cauline similar to the radical.

- Var. *ramosissimum*, C. B. Clarke in F. B. I. ii. 676. *B. ramosissimum*, W. & A. 370; Wt. Ic. t. 1007.

W. Gháts, in the Nilgiris and Pulneys, at 6,000–8,000 ft.; Shevaroy Hills of Salem.

A low bushy plant with more terete stems and shorter leaves, less obtuse at apex or sometimes acute.

3. *BUPLEURUM VIRGATUM*, W. & A. 370. *B. mucronatum* var. *virgatum*, C. B. Clarke in F. B. I. ii. 676.

W. Gháts, in the Pulney Hills, at about 7,000 ft., among grass on the downs.

A tall erect herb with terete stems and narrow, long and sharply mucronate-acuminate leaves; the umbels long-peduncled with many rays.

4. *BUPLEURUM DISTICHOPHYLLUM*, W. & A. 370; F. B. I. 677; Wt. Ic. t. 1006.

W. Ghats, in the Nilgiri Hills, above 7,500 ft., on the open downs.

A slender erect herb, the radial leaves tufted.

A small specimen from the Madgol Hills of Vizagapatam, 4,000 ft. (A. W. Lushington), seems to belong to *B. falcatum*, Linn.

5. *Carum*, Linn.

Annual or perennial herbs. *Leaves* pinnate or decompose. *Flowers* white, polygamous, the sterile flowers often with irregular petals; umbels compound; involueral bracts few or 0; bracteoles numerous, entire. *Calyx*-teeth small or 0. *Petals* broad, obtuse retuse or emarginate. *Fruit* ovoid ellipsoid or oblong, laterally compressed and more or less constricted at the commissure;

mericarps subpentagonal, the inner face flattened; primary ridges usually conspicuous, vittae in the furrows single; carpophore bifid. *Seed* terete, flat or obscurely channelled on the inner face.

CARUM NOTHUM, C. B. Clarke in F. B. I. ii. 681.

Mysore (Lobb); W. Gháts, on rocks above Sispara in W. Nilgiris, at 7,500 ft. (Gamble).

A bulbous-rooted herb reaching about 1 ft. in height, with small leaves with linear segments, the mericarps strongly ridged, the umbels of about 7 rays with linear-lanceolate bracts.

Carum Petroselinum, Benth. and Hook. f., is the Parsley occasionally cultivated, chiefly in the gardens of European residents.

6. Pimpinella, Linn.

Herbs, annual biennial or perennial. *Leaves* simple or compound. *Flowers* in compound umbels, hermaphrodite or polygamo-monoecious; involucrel bracts few or 0, bracteoles usually linear small, or 0. *Calyx*-teeth small, lanceolate. *Petals* with long inflexed points, entire or emarginate. *Styles* usually long, sometimes very short. *Fruit* laterally compressed, usually constricted at the commissure, ovoid; mericarps subpentagonal, the inner face flattened; ridges slender, vittae 2-3 in the furrows between them. *Seed* terete or dorsally compressed, inner face usually flat.

Fruit glabrous or nearly so:—

Fruit short, ovoid or subglobose, didymous, disk obsolete; styles very short; leaves trifoliolate, membranous, subglabrous, the leaflets again sometimes divided, narrowed at base, deeply serrate; bracts 0, bracteoles 1-2 or 0.....1. *Heyneana*.

Fruit ovoid with conspicuous conical disk and long styles:—

Basal leaves orbicular- or broadly ovate-cordate, with narrow sinus or overlapping, serrate, pubescent, about 3-5-nerved, petioles up to 2 in. long, cauline leaves pinnatifid soon reduced to mere petiole-sheaths; bracts and bracteoles 0...2. *Leschenaultii*. Basal leaves orbicular-cordate, with broad (.5-in.) sinus, serrate, hispid pubescent on nerves above otherwise glabrous, about 10-20-nerved, petioles up to 12 in. long, cauline leaves pinnatifid, gradually reduced to linear petiole-sheaths; bracts 0, bracteoles few, linear, persistent.....3. *pulneyensis*.

Fruit papillose—scabrous, ovoid :—

Fruit densely papillose, disk conical; styles long and slender; basal leaves orbicular-cordate, sometimes 3-partite, serrate, pubescent, passing in cauline ones to deeply pinnatifid, and finally to a sheath with pinnatifid blade; bracts and bracteoles many, small, linear.....4. *Candolleana*.

Fruit sparsely papillose, didymous, disk small; styles short; basal leaves, if present, ovate-cordate, acute, serrate, glabrous, lower cauline leaves trifoliate, large, upper also trifoliate, with slender acuminate serrate leaflets; bracts 0, bracteoles 0 or 1-3, small.....5. *monoica*.

1. PIMPINELLA HEYNEANA, Wall.; F. B. I. ii. 684. *Heliosciadium* ? *Heyneanum*, DC.; W. & A. 368.

Circars and Deccan, in hill forests, scarce; W. Gháts, from the Coimbatore Hills to Tinnevely.

An erect annual herb, the flower umbels with many long slender rays.

2. PIMPINELLA LESCHENAULTII, DC.; F. B. I. ii. 687; W. & A. 369; Wt. Ic. t. 1005.

W. Gháts, in the Nilgiris, above 6,000 ft.; on the open downs near sholas with long-petioled basal leaves (Fyson).

An erect almost scapigerous perennial with white flowers.

3. PIMPINELLA PULNEYENSIS, Gamble in Kew Bull. 1919, 228. W. Gháts, at Bear Shola and in other moist woods in the Pulney Hills, about 6,000-7,000 ft. (Bourne).

A tall herb reaching 1-2 ft. high, with long-petioled basal and lower cauline reniform leaves with many palmate nerves, the upper cauline leaves tripartite and lobed; flowers white.

4. PIMPINELLA CANDOLLEANA, W. & A. 369; F. B. I. ii. 687; Wt. Ic. t. 341.

W. Gháts, in the Nilgiris and Pulneys, above 6,000 ft., in grass lands near Shola forests, more scarce to the hills of S. Tinnevely.

An erect tawny pubescent tall perennial with orbicular cordate basal leaves and characteristic papillose fruits, the flowers white.

5. PIMPINELLA MONOICA, Dalz.; F. B. I. ii. 687.

N. Circars, in the hills from Ganjam to Godavari, at low

levels, up to 3,000 ft.; W. Gháts, Mudumalai in Wynaad at 2,000 ft., Anamalais; Shevaroy Hills of Salem.

A tall erect monoecious herb with white flowers and umbels with very slender rays.

7. *Seseli*, Linn.

Herbs. *Leaves* 2-3-pinnate or twice 3-partite. *Flowers* white, in compound umbels; involucre bracts 0 or few, rarely many, bracteoles many. *Calyx*-teeth minute, lanceolate or linear, or 0. *Petals* 5, with a long inflexed acumination. *Styles* short. *Fruit* oblong ovate or globose, broadest at the commissure, not compressed; mericarps semi-terete or compressed dorsally, the inner face flat or sometimes concave; ridges strong, obtuse or subacute, lateral hardly larger than the dorsal; vittae in each furrow solitary, large, others smaller often under the ridges; disk not prominent. *Seed* semi-terete, the inner face somewhat concave.

SESELI INDICUM, W. & A. 371; F. B. I. ii. 693. *Cnidium diffusum*, DC.; Wt. Ic. t. 569.

Plains Districts of the Carnatic (Heyne).

An annual herb, usually diffuse, with many branches, white or pinkish flowers and a globose fruit with prominent ridges and straight hairs stellate at the apex.

8. *Schultzia*, Spreng.

Glabrous perennial herbs. *Leaves* 1-2-pinnate, ultimate pinnae toothed, pinnatifid or multifid. *Flowers* in compound umbels; involucre bracts several, entire or divided, bracteoles numerous. *Calyx*-teeth prominent. *Petals* obovate, emarginate, white. *Fruit* ovate-oblong, the commissure broad; mericarps dorsally compressed, primary ridges slender, furrows between them with 2-4 vittae; carpophore bipartite.

SCHULTZIA ? BENTHAM, C. B. Clarke in F. B. I. ii. 697.

W. Coast, in Canara (Hohenacker).

A tall herb with short pinnate leaves and rather large mericarps with 3 prominent ridges on the back followed by two secondary, in section crescent-shaped, the commissure with 4 vittae, vittae in the furrows between the ridges in pairs.

9. *Polyzygus*, Dalz.

A glabrous herb with tuberous root. *Leaves* ternately and pinnately decomposed, the segments pinnatifid. *Flowers* small, white, in compound umbels; involueral bracts very few or 0; bracteoles few, small, setaceous. *Calyx*-teeth small or the outer slightly larger. *Petals* obovate with an inflexed acumination. *Styles* slender. *Fruit* small, ovoid, terete, broad at the commissure; mericarps semiterete, the primary ridges obscure, furrows between them broad, 1-3-vittate; carpophore bipartite. *Seed* semiterete, flat on the inner face.

POLYZYGUS TUBEROSUS, Dalz.; F. B. I. ii. 698.

W. Gháts, Canara and Mysore (Law).

A weak herb with membranous leaves and tuberous root, very little known.

10. *Peucedanum*, Linn.

Perennial herbs. *Leaves* pinnately or ternately decomposed, the ultimate segments lanceolate or ovate, rarely linear, entire or toothed. *Flowers* white yellow or rarely pink, often polygamous, in compound umbels usually with many rays; bracts of various shapes; bracteoles many, few or 0. *Calyx* with entire or subentire limb; teeth small. *Petals* obovate or cuneate, inflexed at the tip, entire or emarginate. *Disk* undulate, the stylopods usually small. *Ovary* glabrous. *Fruit* much dorsally compressed, elliptic oblong or orbicular; mericarps slightly convex on the back, their margins more or less acutely winged; the dorsal ridges little elevated; vittae usually solitary in the dorsal furrows, 2-6 on the commissure. *Seed* flat, the inner face flat.

Leaflets oblong or oblanceolate, entire; mericarps elliptic, 3 in. long, 2 in. broad, with thick dark margins; dorsal furrows 1-vittate, lateral 2-vittate, commissure 2-vittate, vittae not conspicuous.

1. *Dhana*.

Leaflets linear-lanceolate, distantly serrate; mericarps orbicular, 2 in. in diam., the margins pale and rather thin; dorsal furrows 1-vittate, lateral 1-2-vittate, commissure 4-6-vittate, the vittae conspicuous but often short.....2. *anamallayense*.

1. PEUCEDANUM DHANA, Ham.; F. B. I. ii. 709, var. *Dalzellii*, C. B. Clarke.

E. Gháts, in Ganjam (Barber) and the Madgol Hills of Vizagapatam, at 3,000 ft. (A. W. Lushington).

A glabrous herb reaching 2 ft. in height, the flowers yellow.

2. PEUCEDANUM ANAMALLAYENSE, C. B. Clarke in F. B. I. ii. 710.

W. Gháts, in the Anamalai forests (Wight, Beddome).

A tall herb with fistular fluted stems and much cut leaves with narrow leaflets.

Peucedanum sativum, Benth. and Hook. f., the Parsnip, is occasionally cultivated in gardens.

11. Heracleum, Linn.

Perennial or biennial more or less hairy herbs, often of large size. *Leaves* 1-2-3-pinnate, the segments usually broad, lobed and toothed. *Flowers* white or yellow, often polygamous, in compound umbels, large and with many rays; involucre bracts few, simple or 0, rarely many, foliaceous; bracteoles many. *Calyx*-lobes 0 or small and linear-lanceolate. *Petals* usually unequal, often radiant, the larger often widely spreading, bifid or emarginate, all with an incurved apex. *Ovary* usually pubescent. *Fruit* orbicular, elliptic or obovate, much dorsally compressed, winged, the wing with usually thickened margins; ridges slender; vittae usually solitary in the dorsal furrows, 2-4 or rarely more on the commissure, all descending from the short thick stylopod to below the middle of the fruit and sometimes dilated at the ends. *Seed* much dorsally compressed, plano-convex.

Lower leaves simple, usually 3-lobed, rarely pinnatifid, densely villous; outer flowers of the umbellule usually radiant; mericarps elliptic, broadly winged, vittae usually 4 on the back, 2 on the commissure.....1. *Hookerianum*.

Lower leaves pinnate:—

Pinnae usually 1 to 2 pairs with a terminal usually 3-lobed, large, glabrous; petals equal; mericarps orbicular, broadly winged, vittae usually 6 on the back, 4-6 on the commissure.....2. *aquilegifolium*.

Pinnae 1-3 pairs, small and distant, with a terminal broad 3-lobed, hoary-pubescent; petals equal; mericarps elliptic-obovate, thick on the back, vittae usually 4 on the back, 4 and often more on the commissure.....3. *rigens*.

Pinnae 2-3 pairs, both the side and end ones long and deeply pinnatifid, tawny-pubescent; petals very unequal, the radiant ones very conspicuous; mericarps elliptic or very slightly obovate, 3 to

·4 in. long by ·2-·3 in. broad, the wings narrow, vittae on the back 4, on the commissure usually 24. *ceylanicum*.

Lower leaves bipinnate, sometimes nearly tripinnate:—

Fruit small, elliptic, ·25 by ·2 in., wing narrow, vittae 4 on the back, extending down three-fourths of the face, 2-4 and unequal on the commissure; bracteoles lanceolate, ·15 in. long; lower leaves 1-2-pinnate, the pinnules broad, pinnatifid, shortly crenate-serrate, mucronate, covered above with scattered scales, hispid on nerves beneath5. *Sprengelianum*.

Fruit large, at least ·3 in. long:—

Fruit obovate, ·45 by ·2 in., wing rather broad, vittae 4 on the back, extending down two-thirds of the face, 2 on commissure; bracteoles lanceolate, long acuminate, ·25 in. long; lower leaves much cut, bipinnate, the pinnules deeply lobed, sharply serrate, covered above and on nerves beneath with long soft hairs

6. *courtallense*.

Fruit elliptic, ·3-·4 by ·25-·3 in., wing narrow, vittae 4-6 on the back, extending nearly to the base, 2-4 on commissure; bracteoles lanceolate, ·25 in. long; lower leaves 1- to almost 3-pinnate, the pinnules broad, not deeply lobed, shortly serrate, both surfaces with short soft hairs7. *Candolleanum*.

Leaves pedately 5-7-foliolate, with lanceolate leaflets cuneate at base and sharply serrate above; petals unequal; mericarps apparently unequally winged8. *pedatum*.

1. *HERACLEUM HOOKERIANUM*, W. & A. 373; F. B. I. ii. 715.

Pastinaca Hookeriana, Wt. Ic. t. 1010.

W. Gháts, open downs on the Nilgiris above 7,000 ft.

An erect herb with white flowers sometimes tinged with red, leaves villous and sticky, nearly all radical and flat on the ground, the stem 1 to 1·5 rarely to 2 ft. high.

2. *HERACLEUM AQUILEGIFOLIUM*, C. B. Clarke in F. B. I. ii. 715.

W. Gháts, in the Anamalai Forests (Wight).

An erect herb reaching 2-3 ft. in height.

3. *HERACLEUM RIGENS*, Wall.; F. B. I. ii. 715; W. & A. 373.

Pastinaca rigens, Wt. Ic. t. 1009.

W. Gháts, in the Nilgiri and Pulney Hills, on open downs above 6,000 ft.

A tall, erect, greyish-pubescent herb reaching 3 ft. in height, with yellow flowers, the leaves both radical and cauline, remarkable for the distant, more or less orbicular-cordate, slightly lobed leaflets.

Var. *multiradiatum*, Gamble.

W. Gháts, in the Pulney Hills, at lower levels.

A larger plant with larger and more cut leaflets and very large umbels, often with 30 or more rays 4-5 in. long, commissural vittae sometimes up to 10.

Var. *elongatum*, Gamble.

W. Gháts, in the Pulney Hills (Bourne).

A slenderer plant with thinner leaves, large umbels and an elongated fruit almost oblanceolate, .6 in. by .25 in., vittae on the commissure 2-4.

4. HERACLEUM CEYLANICUM, Gardn.; F. B. I. ii. 716; Fyson Hilt. Fl. 175.

W. Gháts, in the Pulney Hills, on the downs at high levels (Bourne).

A tall handsome species with much cut fern-like leaves, conspicuous white radiant flowers and very large umbels with sometimes over 40 rays, some nearly 6 in. long.

5. HERACLEUM SPRENGELIANUM, W. & A. 372; F. B. I. ii. 716. *Pastinaca Sprengeliana*, Wt. Ic. t. 1008.

W. Ghats, in the Nilgiri Hills, above 6,000 ft., in grassy places near the Sholas (Wight, Gardner), apparently scarce.

A large very leafy plant at once recognized by the small fruit.

6. HERACLEUM COURTALLENSE, Gamble n. comb. *H. rigens*, Wall. var. *Candolleana*, C. B. Clarke in F. B. I. ii. 715 in part. *Pastinaca ligusticifolia*, W. & A. 372; Wt. Ill. t. 116.

W. Gháts, at Courtallum in Tinnevely (Wight).

A tall leafy plant, with much cut deeply serrate leaves and long fruit.

7. HERACLEUM CANDOLLEANUM, Gamble n. comb. *H. rigens*, Wall. var. *Candolleana*, C. B. Clarke in F. B. I. ii. 715 in part. *Pastinaca Candolleana*, W. & A. 372.

W. Gháts, from the Nilgiris to the Anamalai and Pulney Hills, above 6,000 ft. common.

A large leafy plant with broad leaves, shortly serrate.

8. HERACLEUM PEDATUM, Wt. Ic. t. 342; F. B. I. ii. 716.

W. Gháts, in the Pulney and Sivagiri Hills in the undergrowth of Shola forest.

A trailing and rooting herb of ground vegetation, with small white radiant flowers and pedate leaves.

Apium graveolens, Linn., Celery, and *Daucus Carota*, Linn., Carrot, are occasionally cultivated in gardens as vegetables.

Foeniculum vulgare, Gaertn., Fennel, *Anethum Sowa*, Roxb., Dill, and *Coriandrum sativum*, Linn., Coriander, are sometimes cultivated for their leaves and seeds and may occasionally be found run wild.

Family LXXIX. ARALIACEAE.

Trees or shrubs, sometimes climbing, rarely herbs, glabrous or stellately pubescent, frequently prickly. *Leaves* alternate, rarely opposite, long-petioled, large, simple or compound; stipules adnate to the petiole, sometimes within its sheathing base, rarely 0. *Flowers* regular, hermaphrodite or polygamous, in umbels racemes or paniced heads, with bracts and bracteoles; pedicels continuous with the base of the calyx or there articulated. *Calyx*-tube adnate to the ovary; limb truncate or with small teeth. *Petals* usually 5, rarely more, valvate or slightly imbricate, separating or deciduously calyptrate. *Stamens* as many as and alternate with the petals, inserted round an epigynous disk. *Ovary* inferior, 1- to many-celled; ovules solitary in each cell, pendulous; styles as many as the cells, distinct or united. *Fruit* usually drupaceous or dry, cells as many as the ovary. *Seed* pendulous; testa thin; albumen uniform or ruminant; embryo minute, radicle superior.

Petals imbricate in bud :—

Styles 3-5, free; leaves compound, often prickly.....1. **Aralia**.

Styles 5, combined; leaves pinnate.....2. **Pentapanax**.

Petals valvate in bud :—

Ovary 2-celled; leaves compound..... **Nothopanax**.

Ovary 4-10-celled :—

Pedicels jointed; leaves pinnate.....3. **Polyscias**.

Pedicels continuous; leaves digitate.....4. **Schefflera**.

1. **Aralia**, Linn.

Herbs, shrubs or small trees, often prickly. *Leaves* alternate or whorled, digitate pinnate or compound-pinnate; leaflets serrate or nearly entire; stipules small, not prominent. *Flowers* often

polygamo-monoecious, in solitary racemed or paniced rarely compound umbels; pedicels often jointed close under the flower. *Calyx* truncate or 5-lobed. *Petals* 5, ovate, imbricate in bud. *Stamens* 5. *Ovary* 2-5-celled; styles 2-5, free or shortly connate at the base. *Fruit* a small 4-5-celled and -angled or 2-3-celled and subglobose berry. *Seeds* compressed; albumen uniform.

ARALIA MALABARICA, Bedd. Fl. cxxi.; F. B. I. ii. 722.

W. Gháts, Wynaad to Travancore at 2,000-3,000 ft., in evergreen forests.

A large shrub or small tree with scattered prickles on the stems and leaves. Leaves bipinnate, leaflets lanceolate, sharply serrate; flowers in a spreading panicle of prominently bracteate umbels.

A leaf specimen from the Madgol Hills of Vizagapatam (A. W. Lushington) appears to belong to *A. foliolosa*, Seem.; F. B. I. ii. 723, var. *sikkimensis*, C. B. Clarke. It is a small, single-stemmed, erect treelet with very prickly leaves and stems.

2. *Pentapanax*, Seem.

Trees or large climbing shrubs, often epiphytic. *Leaves* alternate, simply pinnate with 3-5 or more leaflets or digitate with 3-5 leaflets, glabrous. *Flowers* hermaphrodite or polygamous, in compound racemes or panicles of umbels; pedicels jointed under the flowers. *Calyx* 5-lobed. *Petals* 5, imbricate in bud. *Stamens* 5. *Ovary* 4-5-celled; styles 4-5, combined at any rate except the tips. *Fruit* 4- or 5-celled and -angled or -ribbed.

PENTAPANAX LESCHENAULTII, Seem.; F. B. I. ii. 724. *Hedera Leschenaultii*, W. & A. 377. *H. trifoliata*, W. & A. 377; Wt. Ic. t. 307.

W. Gháts, in the Nilgiris and southwards at high elevations as on Dodabetta at 8,000 ft.

A tree with 3-5 ovate-acuminate bristly-serrated leaflets, and panicles of globose umbels, the fruit not deeply angled. It is sometimes found growing epiphytically on other trees.

3. *Polyscias*, Forst.

Trees or large shrubs. *Leaves* alternate, pinnate; leaflets entire, coriaceous. *Flowers* in panicles of umbels; bracts small, lanceolate or 0; pedicels articulate under the flower. *Calyx*-limb minutely toothed. *Petals* 5-8, usually 5, free, valvate in bud.

Stamens 5-8, anthers oblong. *Ovary* 5-8-celled, the cells 1-ovuled; styles 5-8, distinct, erect. *Fruit* a 5-angled, subglobose berry with 5-8 pyrenes. *Seed* compressed, albumen uniform.

POLYSCIAS ACUMINATA, Seem.; F. B. I. ii. 727; Bedd. Fl. t. 213. *Hedera acuminata*, Wt. Ic. t. 1063.

W. Gháts, in W. Nilgiris, Anamalais and hills of Tinnevely at 4,500-5,000 ft.

A glabrous tree with long pinnate leaves with many oblong-lanceolate, long-acuminate leaflets, the flower umbels in racemes in a panicle.

4. Schefflera, Forster.

Trees or climbing shrubs. *Leaves* alternate, digitate, rarely compound-digitate or 1-foliolate; leaflets usually coriaceous, entire or distally toothed; petioles long; stipules usually connate within the petiole. *Flowers* in panicles of umbels or compound racemes, usually terminal; bracts usually deciduous; bracteoles 0 or few, sometimes united in a tube; pedicels, if present, not jointed. *Calyx*-mouth truncate or toothed. *Petals* 5-6 or many, valvate. *Stamens* as many as the petals. *Ovary*-cells as many as the petals; styles small, separate or combined in a column. *Fruit* a subglobose, 5-6-angled dry drupe. *Seeds* compressed; albumen uniform.

Flowers pedicellate; bracteoles few or none:—

Styles connate in a cylindric column; trees:—

Flowers in umbels:—

Umbels large, nearly 1 in. in diam., many-flowered, in terminal racemes of rather large flowers; bracts, bracteoles and pedicels woolly; leaflets coriaceous with conspicuous nerves impressed above, raised beneath 1. *rostrata*.

Umbels small, about .5 in. in diam., few- (about 12-) flowered, in lateral panicles of racemes and small flowers; bracts, bracteoles and pedicels glabrous; leaflets chartaceous with slender nerves scarcely impressed or raised.....2. *micrantha*.

Flowers in racemes, in panicles up to 1 ft. long from the wood of the previous year; bracts, bracteoles and pedicels rusty-pubescent; leaflets glaucous beneath, the nerves not conspicuous 3. *racemosa*.

Styles short, not connate in a cylindric column; straggling shrubs:—

Leaflets prominently reticulated :—

Leaflets large, 4 in. long or more ; fruit 5-angled :—

Leaflets obovate, rounded or emarginate at apex or very slightly obtusely pointed, the main nerves oblique, petiolules slender, 1-2 in. long ; umbels in racemes in a terminal panicle often 1 ft. long 4. *stellata*.

Leaflets ovate or elliptic, shortly and suddenly pointed at apex :—

Leaflets chartaceous, the main nerves scarcely more prominent than the secondary and the reticulations, not very oblique, about 60° with the midrib ; panicles with a rather long rhachis 5. *Roxburghii*.

Leaflets coriaceous, the main nerves much more prominent than the secondary and the reticulations, very oblique, about 30° with the midrib ; panicles with a short rhachis

6. *venulosa*.

Leaflets under 2 in. long, coriaceous, obovate, obtuse or emarginate, petiolules .25-.5 in. long ; umbels in subterminal stellate-villous racemes about 1 in. long 7. *Bourdillonii*.

Leaflets not prominently reticulated, oblong, acute, coriaceous, up to 10 in. long, 4 in. broad, petiole 7-15 in. long, petiolules 5-10, 2 in. long or longer ; umbels in large panicles up to 12 in. long.....8. *Wallichiana*.

Flowers sessile, bracteoles 4 to each flower ; leaflets 6-8, oblong, acute or acuminate, up to 6 in. and even 1 ft. long, petiole about 6 in., petiolules stout, 1-2 in. long ; flower-umbels in panicles of racemes with stout branches 9. *capitata*.

1. SCHEFFLERA ROSTRATA, Harms. *Heptapleurum rostratum*, Bedd. ; F. B. I. ii. 729. *Hedera rostrata*, Wt. Ic. tt. 1013, 1014.

Nilgiri Hills, in Kundahs Sholas, above 7,000 ft.

A large tree with 5-9 lanceolate, sometimes denticulate, leaflets, the petiolules about 1 in. long, the nerves conspicuous, meeting in loops near the margin.

2. SCHEFFLERA MICRANTHA, Gamble, n. comb. *H. rostratum* var. *micrantha*, C. B. Clarke in F. B. I. ii. 729.

Nilgiri Hills, along the W. scarp from Naduvatam to Sispara, about 6,000 ft.

A tree with about 6 lanceolate or oblong-lanceolate leaflets, the petiolules .5-1 in. long, the nerves not conspicuous nor meeting in loops.

3. SCHEFFLERA RACEMOSA, Harms. *Heptapleurum racemosum*, Bedd. Fl. t. 214; F. B. I. ii. 729. *Hedera racemosa*, Wt. Ic. t. 1015.

W. Gháts, in Shola Forests of the Nilgiris, Pulneys and southwards, at 3,000–7,000 ft.

A large tree, conspicuous for its large racemose inflorescence, the leaflets oblong-lanceolate, the petiolules 1–2 in. long. Wood soft, grey.

4. SCHEFFLERA STELLATA, Harms. *Heptapleurum stellatum*, Gaertn.; F. B. I. ii. 730. *Hedera obovata*, Wt. Ic. tt. 1011, 1012.

W. Gháts, in Nilgiris and Pulneys, up to 6,000 ft.

A large straggling or climbing shrub with small flowers, the petals usually falling as an operculum.

5. SCHEFFLERA ROXBURGHII, Gamble, n. comb. *Aralia digitata*, Roxb. *Heptapleurum venulosum*, Seem.; F. B. I. ii. 729 *in part*.

N. Circars, in Ganjam and Vizagapatam, in the E. Ghát forests.

A large straggling or climbing shrub with long racemes.

6. SCHEFFLERA VENULOSA, Harms. *Heptapleurum venulosum*, Seem.; F. B. I. ii. 729 *in part*. *Paratropia venulosa*, W. & A. 377; Wt. Ill. t. 118.

Deccan, in hilly country as at Horsleykonda, Chittoor; W. Gháts, on the east slopes; frequent on trees near villages.

A large straggling or climbing shrub, with coriaceous shining leaves, sometimes epiphytic. Bark grey, shining. Vern. *Hind*. Dain.

- Var. *obliquinervia*, Gamble. Leaves more coriaceous, the lower 1 or 2 pairs of nerves rib-like and curving very obliquely nearly to the top; flower racemes less congested.

W. Gháts, in Wynaad, Malabar and Anamalais up to 3,000 ft.

7. SCHEFFLERA BOURDILLONII, Gamble in Kew Bull. 1919, 228. Hills of Travancore, in evergreen forests at about 4,000 ft. (Bourdillon).

An epiphytic shrub about 12 ft. high, growing on large trees.

8. SCHEFFLERA WALLICHIANA, Harms. *Heptapleurum Wal-*

lichianum, C. B. Clarke; F. B. I. ii. 730. *Paratropia Wallichiana*, W. & A. 377.

W. Gháts, in Coorg, Nilgiris, Pulneys and hills of Tinnevely and Travancore up to 6,000 ft.

Apparently a climbing shrub or "somewhat arboreous" (W. & A.), or "a medium-sized tree" (Bourdillon), with large coriaceous leaflets, the main nerves nearly horizontal, the flowers 6-merous.

9. SCHEFFLERA CAPITATA, Harms. *Brassaia capitata*, C. B. Clarke; F. B. I. ii. 732. *Paratropia capitata*, W. & A. 378.

W. Gháts, in Nilgiris and Wynaad, at 3,000–6,000 ft.

A striking tree with large coriaceous digitate leaves and stout flowers, inflorescence, the flowers normally 5- often more -merous.

Nothopanax fruticosum, Miq., is an erect shrub with much cut leaves, frequently grown in gardens as a foliage plant.

Family LXXX. ALANGIACEAE.

Trees or shrubs, armed or not. *Leaves* alternate, petiolate, entire or lobed, usually unequal at base, penninerved or palmately nerved from the base; stipules 0. *Flowers* white or yellowish-white, hermaphrodite, in axillary fascicles, cymes or corymbs; pedicels articulate with the ovary; bracts 0 or small and deciduous. *Calyx*-tube adnate to the ovary, limb truncate or 4–10-toothed. *Petals* 4–10 linear, valvate, thickened, recurved in flower. *Stamens* as many as the petals and alternate with them, or 2–4 times more; filaments free or slightly connate at base where usually villous; anthers elongate, linear. *Ovary* inferior, turbinate, 1–2-celled, surmounted by a disk enclosing the elongate style; stigma large, capitate; ovules solitary in the cells, pendulous. *Fruit* a 1–2-seeded berry, crowned by the calyx-lobes and disk; testa thick; albumen fleshy; cotyledons leafy, flattened, cordate at base; radicle long, terete.

Alangium, Lamk.

CHARACTERS OF THE FAMILY.

Flowers fascicled; stamens 2–4 times as many as the petals; buds about .75 in. long, tawny-pubescent; leaves oblong- or elliptic-lanceolate, more or less 3–5-nerved at the base, berry ellipsoid, pubescent, .75 in. long.....1. *salvifolium*.

Flowers in cymes; stamens as many as the petals; buds slender, about .5 in. long, nearly glabrous; leaves ovate, broad, entire or lobed with acuminate lobes, palmately 3-5-nerved at the base; berry ovoid, glabrous, .25 in. long.....2. *begonifolium*.

1. *ALANGIUM SALVIFOLIUM*, Wang. *A. Lamarekii*, Thw.; F. B. I. ii. 741; Bedd. Fl. t. 215. *A. decapetalum*, Lamk.; W. & A. 325.

Circars, Deccan and Carnatic, in dry regions, in the plains and low hills, common on roadsides.

A deciduous small tree, sometimes straggling, sometimes spinous, with pretty white-scented flowers. Bark grey, orange-yellow when young; wood olive-brown, hard and close-grained, scented, useful for ornamental work and a good fuel. Vern. *Hind.* Akola; *Ur.* Ankula; *Tel.* Ankolamu; *Tam.* Alangi; *Mal.* Arinjil; *Kan.* Ankola.

- Var. *hexapetalum*, Wang. *A. hexapetalum*, Lamk.; W. & A. 326. Leaves thinner, 3-5-nerved at base, cuspidate-acuminate at apex; berry larger; apparently evergreen and usually climbing.

W. Coast, in Malabar and Travancore.

2. *ALANGIUM BEGONIFOLIUM*, Baill. *Marlea begonifolia*, Roxb. Cor. Pl. t. 283; F. B. I. ii. 743.

E. Gháts, Madgol Hills of Vizagapatam above 3,000 ft. (A. W. Lushington).

A small tree with white flowers and broad lobed leaves. Bark grey; wood white and soft.

Family LXXXI. CORNACEAE.

Trees or shrubs, rarely herbs. *Leaves* opposite or alternate, petiolate, entire or angular-lobed or serrate; stipules usually 0. *Flowers* small, hermaphrodite or unisexual, in dichotomously branched panicles cymes or heads, white or yellow or sometimes green or lurid. *Calyx*-tube adnate to the ovary; limb 4-5-lobed or subtruncate. *Petals* 4-5, rarely 0, alternate with the calyx-lobes, imbricate or valvate. *Stamens* as many as and alternate with the petals; filaments short; anthers introrse. *Disk* epigynous, usually fleshy. *Ovary* inferior, 1-4-celled; ovules solitary in the cells, pendulous; style simple or sometimes divided. *Fruit* a drupe or berry, 1-4-celled, with 1-4 bony or crustaceous pyrenes. *Seeds* oblong, terete, pendulous; testa membranous; albumen

copious enclosing the subfoliaceous cotyledons; embryo axile, radicle terete or flattened.

Mastixia, Blume.

Trees, the branches terete. *Leaves* opposite or alternate, petioled, entire. *Flowers* small, hermaphrodite, in terminal many-flowered panicles; bracts small or elongate; bracteoles 2 at the base of the calyx-tube; pedicel articulate. *Calyx*-tube campanulate, limb 4-5-lobed. *Petals* 4-5, ovate, coriaceous, valvate, the apex inflexed. *Stamens* 4-5, alternate with the petals; filaments short; anthers oblong-cordate. *Disk* fleshy, 4-5-lobed. *Ovary* 1-celled; ovule 1, pendulous near the top of the cell; style short, cylindric. *Fruit* an ovoid or ellipsoid drupe, crowned by the scar of the calyx-lobes; putamen woody, grooved down one side. *Seed* ellipsoid; testa membranous; albumen fleshy; cotyledons foliaceous; radicle elongate.

Bracts hardly any; bracteoles small, linear lanceolate; leaves elliptic, suddenly narrowed in a twisted acumen, glabrous, drying black or bluish, paler beneath; inflorescence stout, subglabrous or sparsely puberulous; flower buds .1 in. in diam.; drupe 1 in. by .75 in.....1. *arborea*.

Bracts leafy, up to .75 in. long; leaf-acumen not or slightly twisted; flower-buds about .05 in. in diam.:—

Bracteoles conspicuous, linear; leaves elliptic, glabrous, drying grey, almost glaucous beneath; inflorescence slender and spreading, tawny-villous; drupe not known2. *Meziana*.

Bracteoles small, lanceolate-acuminate; leaves elliptic-oblong, glabrous or puberulous when young, drying olive-green, pale beneath; inflorescence slender but close, densely white-villous; drupe oblong, 1.25 by .5 in.....3. *pentandra*.

1. MASTIXIA ARBOREA, C. B. Clarke; F. B. I. ii. 745; Bedd. Fl. t. 216. *Bursinopetalum arboreum*, Wt. Ic. t. 956.

W. Gháts, from S. Canara southwards, in evergreen forests from 3,000 ft. upwards.

A large tree with coriaceous leaves and a large greenish-purple drupe. Bark pale brown, lenticellate; wood greyish-yellow, soft.

2. MASTIXIA MEZIANA, Wangerin in Fedde Rep. iv. 336.

W. Coast, in Malabar and northwards (*teste* Wangerin).

A tree with conspicuously bracteate inflorescence.

3. *MASTIXIA PENTANDRA*, Bl.; F. B. I. ii. 746.

W. Coast and W. Ghâts, in Canara and Malabar to Travancore, in evergreen forests and on river banks up to 1,000 ft. A very large tree (Bourdillon) with elliptic-oblong leaves up to 6 in. long, 2·5 in. broad. Wood greyish-white, soft.

III. COROLLIFLORAE.

Sepals herbaceous, often connate in a usually persistent calyx, more or less adnate to the ovary or free. *Petals* usually as many as the sepals or sometimes fewer, usually 4–5, rarely 6 or more, very rarely biseriate, almost always combined in a corolla. *Stamens* 1-seriate, as many as the petals or fewer, sometimes biseriate and twice as many as the petals, sometimes but more rarely indefinite; filaments usually adnate to the corolla-tube, rarely free. *Carpels* usually connate, the styles free, sometimes free and then the styles united.

Family LXXXII. CAPRIFOLIACEAE.

Small trees or shrubs, erect or climbing. *Leaves* opposite, rarely alternate, simple lobed or imparipinnate; stipules usually 0. *Flowers* hermaphrodite, regular or irregular, in cymes or panicles. *Calyx* adnate to the ovary; lobes 3–5, imbricate. *Petals* connate in a tubular, funnel-shaped or rotate corolla, 5-fid, with imbricate lobes. *Stamens* 5, rarely 4, inserted on the corolla-tube alternately with the lobes; filaments filiform or subulate; anthers 2-celled, introrse, dehiscing longitudinally. *Ovary* inferior, 2–8-, rarely 1-celled; style terminal; stigma capitate, or short with 2–5 lobes; ovules solitary, pendulous, or several on axile placentas. *Fruit* a drupe with 1–8 cartilaginous pyrenes or a many-seeded berry. *Seeds* 1 or many in each cell; albumen copious, fleshy; embryo usually minute with ovate cotyledons.

Corolla-limb regular, flowers small; ovary cells 1-ovuled; stigma lobed.....1. **Viburnum**.
Corolla-limb regular or irregular, flowers rather large; ovary cells many-ovuled; stigma capitate.....2. **Lonicera**.

1. *Viburnum*, Linn.

Trees or shrubs. *Leaves* opposite, petioled, simple or lobed, entire dentate or serrate; stipules inconspicuous or 0. *Flowers*

in terminal or subterminal umbels, corymbs or thyrsoid panicles, white greenish or pink; bracts and bracteoles usually deciduous. *Calyx*-tube turbinate or cylindric; lobes 5, short, persistent. *Corolla* rotate, tubular or campanulate, lobes 5. *Stamens* 5, inserted on the corolla-tube. *Ovary* 1-3-celled; ovules 1 in each cell, pendulous; style short; stigma 3-lobed. *Fruit* a dry or fleshy drupe, usually 1-seeded; endocarp crustaceous, ridged and furrowed or excavated on one side. *Seed* compressed; albumen uniform or ruminant; embryo minute with small cotyledons and cylindric superior radicle.

Flowers in erect compound umbels:—

Corolla rotate, the lobes ovate, spreading, bracts persistent; leaves elliptic, acuminate, entire, the margins recurved, up to 5 in. long, 2 in. broad, covered beneath, like the branchlets and inflorescence, with round peltate scales; drupe oblong, flattened, punctate

1. *acuminatum*.

Corolla tubular, the lobes short, erect; drupe glabrous; no peltate scales but tufts of hair in the axils of the leaf-nerves beneath:—

Corolla glabrous; bracteoles deciduous; drupe ellipsoid; leaves ovate-lanceolate, long-acuminate, entire or slightly serrate with about 4-6 pairs of nerves the lower only subopposite.

2. *coriaceum*.

Corolla pubescent; bracteoles linear, persistent; drupe ovoid; leaves ovate, acute, distantly slightly dentate with about 4 pairs of nerves, the 2 lower prominent, opposite or subopposite from near the base.....3. *hebanthum*.

Flowers in drooping panicles; corolla cylindric, the lobes hypocrateriform, spreading; no peltate scales, but the inflorescence, nerve-axils and petioles villous; leaves ovate, acute, serrate, with about 4-6 pairs of prominent, subopposite or alternate nerves; drupe ovoid-oblong, the endocarp with a T-shaped ventral groove ... 4. *erubescens*.

1. **VIBURNUM ACUMINATUM**, Wall.; W. & A. 388; Wt. Ic. t. 1021. *V. punctatum*, Ham., var. *acuminatum*, C. B. Clarke in F. B. I. iii. 5; Bedd. Fl. t. 217.

N. Circars, Mahendragiri Hill at 4,000 ft.; Deccan, in Mysore and the hills of N. Coimbatore; W. Gháts, from Mysore to Travancore, in evergreen forests at 3,000 to 6,000 ft.

A small evergreen tree with white flowers. Bark thin,

brown, tessellated; wood light red, hard and close-grained. Vern. *Tam.* Konakaran; *Badaga*, Yellé sundé.

2. *VIBURNUM CORIACEUM*, Bl.; F. B. I. iii. 6. *V. capitellatum*, W. & A. 388. *V. hebanthum*; Wt. Ic. t. 1023, letterpress 1022 (?).

Deccan, hills of N. Coimbatore; W. Gháts, about Coonoor in Nilgiris at 6,000 ft., sometimes higher, more common in Pulneys, on the margins of Sholas.

A small evergreen tree with whitish flowers.

3. *VIBURNUM HEBANTHUM*, W. & A. 388; F. B. I. iii. 6. *V. capitellatum*, Wt. Ic. t. 1022, letterpress 1023 (?).

W. Gháts, in Nilgiri Shola Forests at 6,000–8,000 ft., common about Ootacamund.

A small tree with bright green foliage and a strong, heavy, unpleasant smell, the flowers greenish-white. Bark brown, thin, lenticellate; wood light reddish-brown. Vern. *Badaga*, Kadambu.

4. *VIBURNUM ERUBESCENS*, Wall.; F. B. I. iii. 7. *V. Wightianum*, W. & A. 388; Wt. Ic. t. 1024.

W. Gháts, in the higher Sholas of Nilgiris at and above 7,000 ft., common, less so in the Pulney Hills.

A small tree with drooping thyrsi of white or pinkish flowers on red stalks, the fruit red. Bark thin, grey; wood soft, reddish.

2. *Lonicera*, Linn.

Erect or climbing shrubs. *Leaves* opposite, petioled sessile or sometimes connate, entire or sometimes sinuate; stipules 0. *Flowers* of various sizes, usually in peduncled pairs, axillary and solitary or in subterminal heads panicles or clusters; bracteoles 2. *Calyx*-tube ovoid or globose; limb short, 5-toothed. *Corolla* tubular campanulate or funnel-shaped, often irregular; limb 5-cleft. *Stamens* 5, inserted on the corolla-tube. *Ovary* 2–3-celled; ovules several in each cell in double rows on axile placentas; style slender; stigma capitate. *Fruit* a fleshy 2–3-celled berry; the berries in pairs or sometimes more or less united. *Seeds* few in each cell; testa crustaceous; albumen fleshy; embryo terete.

Climbing shrub; corolla-tube much elongate, 2-lipped; leaves ovate, acuminate, densely grey-tomentose beneath, up to 3 in. long; berries distinct.....1. *Leschenaultii*.

Erect shrub; corolla-tube shortly elongate and gibbous at base, 5-lobed; leaves lanceolate, nearly glabrous beneath, up to 2 in. long; berries combined, the pair enclosed in a membranous bract, the calyx-limb with a reflexed ring below the lobes.....2. *ligustrina*.

1. *LONICERA LESCHENAULTII*, Wall.; F. B. I. iii. 10; W. & A. 389; Wt. Ill. tt. 120 and 121 B.

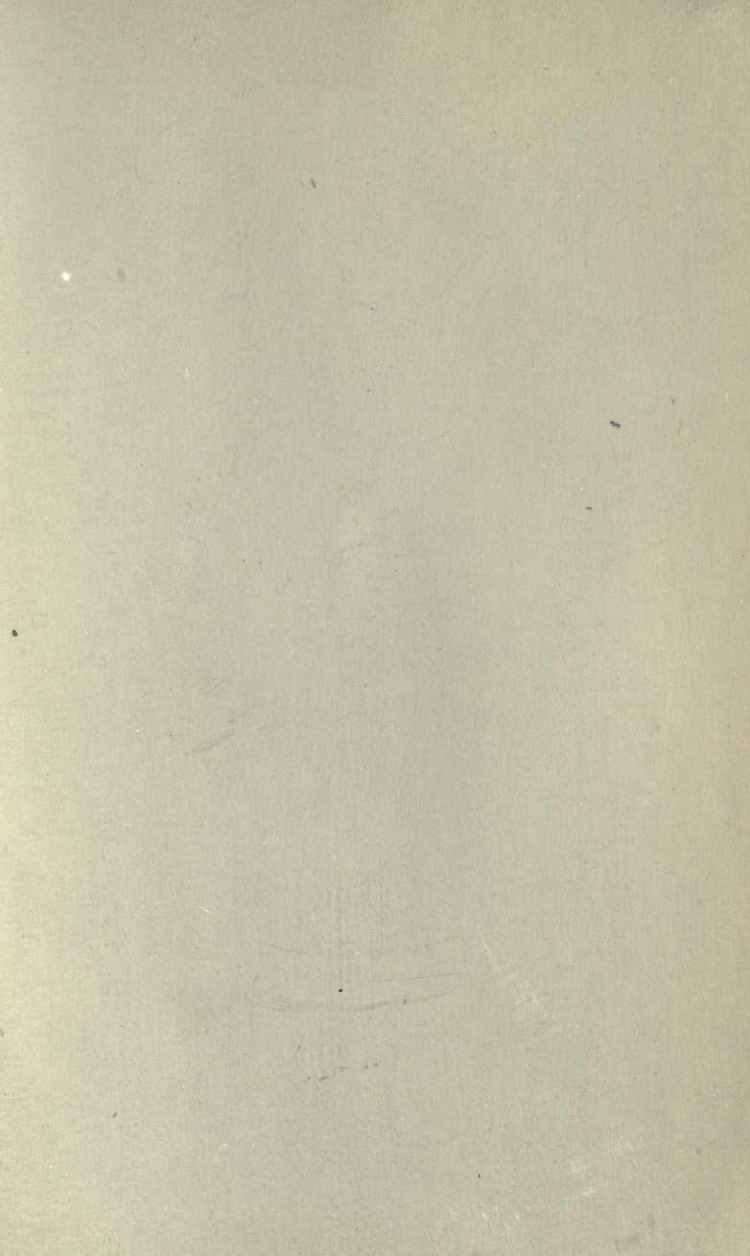
Hills of the Deccan, Carnatic and W. Gháts above 5,000 ft.

A climbing shrub with light brown papery bark and creamy-white flowers.

2. *LONICERA LIGUSTRINA*, Wall.; F. B. I. iii. 12; W. & A. 389; Wt. Ic. t. 1025.

W. Gháts, in the Nilgiris and Pulneys above 6,000 ft.

An erect shrub with twisted stems, light brown papery bark, small leaves and creamy-white flowers, sometimes used as a hedge-plant.



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FLORA
OF THE
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VOL. II

*PREFACE TO THE SECOND RE-PRINTED EDITION,
PREFACE TO THE RE-PRINTED EDITION, FOREWORD,
PREFACE, CONTENTS, AUTHOR'S NOTE, NOTES
ON PART XI, GENERAL DESCRIPTION,
ABBREVIATIONS, GLOSSARY AND
KEY TO FAMILIES.
FLORA: RANUNCULACEAE TO CAPRIFOLIACEAE*

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OF THE GOVERNMENT OF INDIA

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PREFACE TO THE SECOND REPRINTED EDITION

The 'Flora of the Presidency of Madras' by J. S. Gamble was published in its first edition from 1915 to 1935. When the Botanical Survey of India was revived in 1954, one of the first proposals received from numerous individuals and universities was that this Flora, which had been out of print for many years, should again be made available to students.

In answer to such requests this Flora was reprinted in 1957, and the book at once found great favour with botanists and students ; the handy format and the very low price of the book were some of the factors that made it attractive to students. This reprinted edition was soon exhausted, and the demand for copies of the same has been mounting with the passing of time.

The present edition is a reprint of that of 1957 ; the format and style are exactly the same in both editions, the pagination remains unaltered. As a measure of long-range economy this present edition is being brought out by off-set process which will at the same time guarantee the accuracy of this as compared with the first reprinted edition.

No changes have been made in the nomenclature of plants listed in this Flora. The Botanical Survey of India is now busily engaged in the preparation of check-lists of all the plant names included in Gamble's and other Floras, a very important preliminary towards the final revision of all our provincial Floras.

Botanical Survey of India,
14, Madan Street, Calcutta. 1967.

H. SANTAPAU, S.J

PREFACE TO REPRINTED EDITION

When the Botanical Survey of India was reorganised in 1954 the Government of India decided on the advice of the eminent Botanists of the country that the important Floras of the country which had gone out of print should be reprinted in order to provide immediate facilities of work on Systematic Botany of Phanerogams by students and Botanists of the country. The reprints are now being issued accordingly.

One particular point needs a special mention here. The Government of India, while recognising fully the need for bringing the Floras of the country *upto date after a thorough revision*, cannot overlook the fact that such work is possible only on an extensive and thorough exploration of both regions already explored and those hitherto unexplored and a proper rating of the information thus obtained with the materials in the already published Floras. For this reason alone, there is ample justification for a reprint of the old Floras; the present effort is therefore the starting point in the greater project of the review of the Flora of our country. It is hoped that these publications should thus meet the long-felt requirement of the Botanists of the country.

Owing to the necessity to conform to certain printing stipulations and using the same size of paper for all the reprinted Floras, the paginations in the reprinted volumes differ from the original. But the index, which is correspondingly corrected, would, it is hoped, enable reference without inconvenience.

The corrections mentioned in the corrigenda have been incorporated and some of the printing mistakes in the original flora have been corrected in this publication.

The reprint is being bound in three volumes as suggested in the original publication.

J. C. SEN GUPTA

Chief Botanist

Botanical Survey of India.

14, Madan Street,
Calcutta, 1957.

FLORA
OF THE
PRESIDENCY OF MADRAS

BY
J. S. GAMBLE, C.I.E., M.A., F.R.S., F.L.S.
LATE OF THE INDIAN FOREST DEPARTMENT

PART IV
RUBIACEAE TO EBENACEAE.

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CALCUTTA

1936

INTRODUCTION TO PART IV.

THIS Part ends with the description of the genus *Diospyros*; the key to the species and their enumeration will begin Part V.

I think it well here to draw attention to *Supplementary Notes* which are being published, *from time to time*, in the 'Kew Bulletin.' The following have already appeared:

No. I, by Mr. S. T. DUNN, 1916, p. 57;

No. II, by Mr. J. S. GAMBLE, 1918, p. 222;

No. III, by Mr. J. S. GAMBLE, 1920, p. 49.

Others will appear by degrees.

J. S. GAMBLE.

Liss: June, 1921.

FLORA OF MADRAS.

Family LXXXIII. RUBIACEAE.

Trees shrubs or herbs, erect prostrate or climbing. *Leaves* opposite or whorled, entire; stipules various, inter- or intrapetiolar, sometimes united together or to the leaves, entire toothed or setose, very rarely 0. *Flowers* hermaphrodite, rarely unisexual, usually regular, the inflorescence various. *Calyx*-tube adnate to the ovary; limb various. *Corolla* regular, gamopetalous; lobes 4—5, valvate imbricate or contorted. *Stamens* as many as the corolla lobes, inserted on its mouth or tube; filaments short or long; anthers 2-celled. *Disk* epigynous, usually annular or cushion-shaped. *Ovary* inferior, 2—10-celled; ovules 1 or more in each cell; style simple or cleft; stigmas various. *Fruit* 2—10-celled, a berry drupe or capsule or of separating cocci. *Seeds* various; albumen fleshy or horny; cotyledons flat or semi-terete; radicle superior or inferior.

Ovules, with few exceptions, more than 2, usually numerous, in each cell:—

Flowers collected in dense globose heads:—

Trees or shrubs:—

Calyx-tubes fused into a fleshy mass; ovary 2-celled; stigma fusiform

1. *Nauclea*.

Calyx-tubes not fused into a fleshy mass:—

Corolla-lobes imbricate; flowers ebracteolate:—

Stigma fusiform; seeds not winged.....2. *Anthocephalus*.

Stigma globose; seeds winged.....3. *Neonauclea*.

Corolla-lobes valvate; flowers bracteolate:—

Stigma clavate; calyx-limb 5-lobed.....4. *Adina*.

Stigma mitriform; calyx-limb truncate.....5. *Mitragnya*.

Climbing shrubs with peduncles sometimes transformed into hooks

6. *Uncaria*.

Flowers not usually collected in dense globose heads:—

Fruit capsular, 2- rarely 4-celled:—

Corolla-lobes twisted in bud, imbricate.....7. *Wendlandia*.

Corolla-lobes valvate:—

Seeds winged; flowers in terminal panicles:—

Capsule loculicidal; flower panicles with foliaceous reticulate petioled bracts; corolla-lobes glabrous.....8. *Hymenodictyon*.

Capsule septicidal; no foliaceous bracts; corolla lobes with pilose margins.....9. *Cinchona*.

Seeds not winged:—

Corolla-lobes toothed on each side.....9. *Dentella*.

Corolla-lobes entire:—

Anthers connivent, dehiscing by apical pores; corolla rotate:—

Stigma 1, capitate; small herbs with thin leaves and small stipules
10. *Argostemma*.

Stigmas 2, capitate; large herbs with large leaves and large, usually bifid stipules.....11. *Neurocalyx*.

- Anthers not connivent, dehiscing laterally:—
 Calyx-teeth 4; capsule septi- or loculi-cidal or indehiscent:—
 Seeds numerous, minute, angular or rounded; testa reticulate or pitted.....12. *Oldenlandia*.
 Seeds few, plano-convex or globose with a ventral cavity.....13. *Anotis*.
 Calyx-teeth 5; capsule obcordate, of 2 compressed lobes, loculicidal above the calyx.....14. *Ophiorrhiza*.
- Fruit a fleshy berry:—
 Corolla-lobes valvate in bud; seeds many:—
 Inflorescence terminal:—
 Calyx with 1 lobe usually forming a coloured leaf.....15. *Mussaenda*.
 Calyx-lobes 5, slender, no coloured leaf.....16. *Acranthera*.
 Inflorescence axillary; calyx 4—7-lobed:—
 Cymes loose and spreading; leaves large, membranous.....17. *Mycetia*.
 Cymes close; leaves small, nearly coriaceous.....18. *Urophyllum*.
 Corolla-lobes imbricate; inflorescence terminal; corolla-tube long, cylindric.....*Hamelia*.
- Corolla-lobes twisted in bud:—
 Inflorescence terminal:—
 Flowers bisexual.....19. *Chomelia*.
 Flowers dioecious.....20. *Byrsophyllum*.
 Inflorescence usually axillary:—
 Ovary 2-celled.....21. *Randia*.
 Ovary 1-celled.....22. *Gardenia*.
 Ovary 2—3-celled, flowers in axillary clusters.....23. *Tricalysia*.
 Ovules 2 in each cell, 1 pendulous, 1 erect.....24. *Scyphiphora*.
 Ovules usually solitary in each cell:—
 Radicle superior:—
 Corolla-lobes valvate in bud:—
 Fruit of 2 mericarps separating from a columella; herbaceous plants.....25. *Knoxia*.
 Fruit a drupe with 2-many free or cohering pyrenes; shrubs or trees:—
 Ovary 2-celled.....26. *Plectronia*.
 Ovary 3—5-celled.....27. *Vangueria*.
 Corolla-lobes twisted in bud; ovary 1-celled, 1—2-ovuled.....28. *Octotropis*.
- Radicle inferior:—
 Corolla-lobes twisted in bud:—
 Flowers in panicles or corymbs, no calyculus:—
 Flowers 4-merous; style glabrous:—
 Bracts coriaceous, not sheathing; style 2-branched; leaves thick.....29. *Ixora*.
 Bracts membranous, lower sheathing; style entire; leaves thin.....30. *Pavetta*.
 Flowers 5-merous; style often hairy; leaves leathery.....31. *Stylocoryne*.
 Flowers solitary or in axillary fascicles; calyculus single or double.....32. *Coffea*.
- Corolla-lobes valvate in bud:—
 Ovules basal:—
 Style short; fruit a drupe with 2 or more pyrenes:—
 Inflorescence terminal, corymbose or panicled, rarely capitate:—
 Corolla usually short and straight.....33. *Psychotria*.
 Corolla usually curved.....34. *Chasalia*.
 Inflorescence capitate or fascicled, axillary or terminal:—
 Creeping herbs with cordate leaves.....35. *Geophila*.
 Erect herbs with narrow leaves.....36. *Fergusonia*.
 Erect shrubs with distichous leaves.....37. *Lasianthus*.
 Flowers solitary or few; fetid shrubs.....38. *Saprosma*.
 Style long; fruit a capsule.....39. *Hamiltonia*.
 Ovules on the septum:—
 Trees or shrubs; stipules undivided:—
 Flowers sessile, in capitate heads, the calyx-rubes confluent.....40. *Morinda*.

- Flowers pedicelled, the calyx-tubes not confluent.....41. **Prismatomeris.**
 Herbs or undershrubs; stipules connate:—
 Fruit large, indehiscent, 2-celled; fleshy coast herb; stipules entire or
 toothed.....42. **Hydrophylax.**
 Fruit small, dehiscent in 2 cocci; erect or prostrate herbs or under-
 shrubs; stipules pectinate.....43. **Borreria.**
 Herbs with whorled leaves; without stipules, or stipulate only when leaves
 opposite:—
 Corolla 5-merous; fruit fleshy.....44. **Rubia.**
 Corolla 4-merous; fruit dry.....45. **Galium.**

1. *Nauclea*, Linn. emend.

Trees or shrubs. *Leaves* petioled; stipules persistent or caducous. *Flowers* crowded in globose, usually solitary, terminal, pedunculate heads, the calyx-tubes fused into a fleshy mass with the receptacle; bracts stipular; bracteoles 0. *Calyx*-lobes 4—5, persistent or caducous. *Corolla*-tube long, funnel-shaped, the throat glabrous; lobes 4—5, imbricate. *Stamens* 4—5, on the throat of the corolla, subsessile; anthers ovate, acute. *Ovary* 2-celled; ovules very many, imbricate, on pendulous placentas; style long; stigma fusiform. *Fruit* a fleshy globose mass of 2-celled pyrenes with very thin septa. *Seeds* few in each cell, ovoid, imbricate, not winged; testa crustaceous, usually pitted; albumen fleshy; embryo rather large, radicle inferior.

NAUCLEA MISSIONIS, W. & A. 392; F. B. I. iii. 27.

W. Coast, in Malabar and Travancore, up to 1,500 ft., on river banks.

A small evergreen tree with elliptic-lanceolate, glabrous, shining leaves up to 5 in. long and yellowish-white fragrant flowers. Bark smooth; wood dark yellow, moderately hard. Vern. *Tam. Mal.* Attu vanji.

Nauclea orientalis, Linn. (*Sarcocephalus cordatus*, Miq.; F. B. I. iii. 22) is a large tree native of Ceylon and elsewhere, sometimes planted in gardens in Madras.

2. *Anthocephalus*, A. Rich.

Trees; branchlets thick, terete. *Leaves* petioled, ovate; stipules lanceolate, caducous. *Flowers* crowded in terminal, peduncled, globose, solitary heads; bracts stipular, at the base of the peduncle; bracteoles 0. *Calyx*-tubes closely pressed together but not fused, 5-lobed. *Corolla*-tube long, funnel-shaped, throat glabrous; lobes 5, imbricate. *Stamens* 5, on the throat of the corolla; filaments short; anthers ovate-sagittate, apiculate. *Ovary* 4-celled above, 2-celled below; ovules very many, horizontal, on 2 bifid placentas which ascend from the seprum and send arms into the upper cells; style filiform, exserted; stigma fusiform. *Fruit* a fleshy orange globose enlarged receptacle on which the capsules are embedded, the capsules having, under the thin envelope, 4 crustaceous caps to the upper part, the lower part membranous and fragile. *Seeds* many, angular; testa muriculate; albumen fleshy; embryo minute with rounded cotyledons, radicle superior, cylindric.

ANTHOCEPHALUS INDICUS, A. Rich. *A. Cadamba*, Miq.; F. B. I. iii.

23. *Nauclea Cadamba*, Roxb.; Bedd. Fl. t. 35.

N. Circars, along river banks; Deccan, in Kurnool and Cuddapah; W. Coast and W. Ghâts, at low levels in wet places up to 1,500 ft., frequently cultivated for ornament.

A large deciduous tree with clean cylindrical stem and horizontal branches, the leaves reaching 1 ft. in length and 6 in. in breadth and often pubescent beneath, the fragrant flowers in handsome large globular orange heads with white stigmas, the fruit yellowish, fleshy. Bark dark grey; wood white or yellowish, soft and even-grained, but little used. Vern. *Hind.* Kadam; *Ur.* Kadambo; *Tel.* Kadambe; *Tam.* Vella cadambu; *Mal.* Attu ték, Kodavara.

3. *Neonauclea*, Merr.

Trees or shrubs. *Leaves* sessile or petioled; stipules entire, flat, deciduous. *Flowers* crowded in globose, solitary or, sub-panicked, peduncled heads; bracts large, caducous; bracteoles setiform, glabrous, or 0. *Calyx*-tube prism-shaped; lobes 5, linear or triangular subulate, often with valvate processes at the apex. *Corolla*-tube funnel-shaped; lobes 5, imbricate. *Stamens* 5, on the throat of the corolla; anthers oblong or linear. *Ovary* 2-celled; ovules numerous in each cell on pendulous placentas; style long, thickened; stigma globose. *Fruit* a globose receptacle bearing capsules each of 2 cocci, usually separating from a persistent axis. *Seeds* imbricate, elongate, flattened; testa striate, winged, the upper wing 2-horned, the lower acuminate; albumen fleshy.

NEONAUCLEA PURPUREA, Merr. in Interp. Rumph. Herb. Amb. 483. *Nauclea purpurea*, Roxb. Cor. Pl. t. 54; F. B. I. iii. 26; W. & A. 391 in part. *N. elliptica*, Bedd. Ic. t. 19.

N. Circars, hills of Godavari at 2,000 ft., in moist valleys; Deccan, hills of Coimbatore; W. Ghâts, from S. Canara to Malabar, up to 3,000 ft.

A small tree with elliptic-lanceolate acute leaves up to 8 in. long and heads of purple flowers. Wood light red, smooth, even-grained. Vern. *Kan.* Ahnan; *Tel.* Bagada.

4. *Adina*, Salisb.

Trees or shrubs; branchlets terete. *Leaves* petioled, ovate-lanceolate or cordate; stipules large, caducous. *Flowers* small, crowded in solitary or panicked globose peduncled heads, the receptacle with stiff hairs; bracts in pairs on the peduncle or 0; bracteoles paleaceous. *Calyx*-tube 5-angled; lobes 5. *Corolla*-tube elongate, funnel-shaped at top, the throat glabrous; lobes 5, valvate. *Stamens* 5, on the mouth of the corolla; filaments short; anthers oblong. *Ovary* 2-celled; ovules numerous, on a pendulous placenta in each cell; style filiform; stigma clavate or capitate. *Fruit* a cluster of capsules each separating into 2 follicular cocci, many-seeded. *Seeds* oblong; testa winged, reticulate; albumen fleshy; cotyledons flat; radicle superior, cylindric.

ADINA CORDIFOLIA, Hook. f.; F. B. I. iii. 25; Brand. For. Fl. t. 33. *Nauclea cordifolia*, Willd.; Roxb. Cor. Pl. t. 53; W. & A. 391; Bedd. Fl. t. 33.

All dry deciduous forests in the Circars, Deccan and Carnatic, less common in W. Gháts, usually sporadic but occasionally gregarious on old cultivated lands.

A large and beautiful deciduous tree with orbicular-cordate abruptly acuminate large leaves, yellow flowers in rather small heads and capsular fruits with small narrow seeds tailed above. Bark thick, grey, rough; wood yellow, moderately hard and even-grained, used for furniture, agricultural implements, combs, etc., in Coconada for cigar-boxes. Young trees are often cut for house-posts. Vern. *Hind.* Haldu; *Ur.* Holonda; *Tel.* Bandaru; *Tam.*, *Mal.* Manja kadambe; *Kan.* Ahnau.

5. *Mitragyna*, Korth.

Trees or shrubs; branchlets terete. Leaves petioled; stipules large, caducous. Flowers crowded in globose, axillary and terminal, solitary or panicle, pedunculate heads, the receptacle hirsute; bracts 2, on the peduncle, caducous, with often 2 small leaves; bracteoles many, paleaceous. Calyx-tube obconic, truncate or 5-toothed; limb tubular or 0. Corolla-tube funnel-shaped, the throat glabrous or pilose; lobes 5, valvate. Stamens 5, on the throat of the corolla-tube; filaments short; anthers oblong, apiculate. Ovary 2-celled; ovules many, imbricate, on pendulous placentas in each cell; style filiform; stigma mitriform, hollow at base. Fruit a globose head of capsules, each with 2 follicular cocci, many-seeded. Seeds flattened, testa winged, reticulate; albumen fleshy; cotyledons flattened; radicle superior.

Calyx-limb short; corolla light yellow; leaves usually obtuse.....1. *parvifolia*.
Calyx-limb elongate; corolla purple; leaves more or less acuminate...2. *tubulosa*.

1. MITRAGYNA PARVIFOLIA, Korth. *Stephegyne parvifolia*, Korth.; F. B. I. iii. 25. *Nauclea parvifolia*, Roxb. Cor. Pl. t. 52; W. & A. 396; Bedd. Fl. t. 34.

All dry deciduous forests in the Circars, Deccan and Carnatic, less common on W. Coast, and sometimes in evergreen forests and on old cultivated lands, sporadic.

A large deciduous tree with leaves very variable in shape and size. Bark light grey, smooth; wood light pinkish-brown, even-grained, used for furniture, implements and utensils. Vern. *Hind.* Kadam; *Ur.* Mundi-mundi; *Tel.* Nir kadambe; *Tam.* Chinna kadambu; *Mal.* Vinba; *Kan.* Kongu.

2. MITRAGYNA TUBULOSA, Hav. in Journ. Linn. Soc. xxxiii. 70. *Stephegyne tubulosa*, Hook. f.; F. B. I. iii. 25. *Nauclea tubulosa*, Arn.; Bedd. Ic. t. 18.

W. Coast, in Cochin and Travancore, both in evergreen and deciduous forests, often in grassy lands at the foot of the hills.

A small deciduous tree with purple flowers and a pinkish-brown wood. Vern. *Mal.* Malan thumha.

6. *Uncaria*, Schreb.

Climbing shrubs with usually angular branchlets and sometimes having some of the axillary peduncles changed into strong recurved

hooks. *Leaves* petioled: stipules interpetiolar, entire or bifid. *Flowers* in terminal or axillary, peduncled, solitary or paniced, globose heads; bracts in pairs on the peduncle, bracteoles small or 0. *Calyx*-tube fusiform; limb 5-lobed or -partite. *Corolla*-tube long, funnel-shaped; lobes 5, valvate or imbricate. *Stamens* 5, on the throat of the corolla; filaments short; anthers oblong with 2 basal bristles. *Ovary* 2-celled: ovules many, imbricate, on projecting placentas; style slender; stigma capitate or clavate. *Fruit* a head of capsules, each capsule elongate, septicidally 2-valved, many-seeded. *Seeds* imbricating upwards, very small; testa with long wings above and below; albumen fleshy; embryo clavate.

UNCARIA SESSILIFRUCTUS, Roxb.: F. B. I. iii. 30.

N. Circars, hills of Vizagapatam, at 5,000 ft. (A. W. Lushington).

A large climber with thin, elliptic, acute leaves up to 4.5 in. long and prominent curved axillary hooks.

7. *Wendlandia*, Bartl.

Small trees or shrubs. *Leaves* opposite or ternately whorled: stipules entire or 2-fid. *Flowers* small, white pinkish or yellowish, in dense terminal thyrsoïd or paniced cymes; bracteoles 2—3, sometimes more, on the pedicels. *Calyx*-tube subglobose; lobes 4—5, small, persistent. *Corolla* tubular-salver- or funnel-shaped, globose or hairy within; lobes 4—5, imbricate in bud. *Stamens* 4—5, between the corolla-lobes; anthers versatile, exserted. *Ovary* 2- rarely 3-celled; ovules numerous on small globose placentas adnate to the septum; style filiform; stigma 2-fid. *Fruit* a small globose loculicidal capsule, 2-valved. *Seeds* very small; testa membranous, reticulate; albumen fleshy; embryo short.

Corolla-tube short, equal to the lobes; stamens prominently exserted; calyx-tube villous; leaves lanceolate, grey-pubescent beneath as are the branchlets; stipules ovate-acute recurved.....1. *exserta*.
Corolla-tube elongate, slender, longer than the lobes; stamens sessile or with short filaments:—

Calyx-tube glabrous:—

Leaves usually opposite; bracteoles subulate, short:—

Branchlets glabrous; leaves elliptic-lanceolate, petioles nearly 1 in. long; stipules short, truncate or abruptly cuspidate; corolla-tube .25 in. long, glabrous within.....2. *glabrata*.
 Branchlets pubescent; leaves obovate-acuminate, sometimes ternate, petioles about .5 in. long; stipules ovate-oblong, bifid at apex; corolla-tube .15 in. long, villous within.....3. *bicuspidata*.

Leaves ternately whorled, linear-lanceolate, petioles short; stipules triangular-ovate, 1—2-cuspidate; corolla-tube .2 in. long, nearly glabrous within; bracteoles long; branchlets glabrous.....4. *angustifolia*.

Calyx-tube pubescent:—

Leaves usually opposite, rarely whorled, elliptic-lanceolate, acuminate, petioles .25 to .5 in. long, under surface slightly pubescent as are branchlets; stipules ovate, keeled, cuspidate; corolla-tube .15 in. long, villous within; calyx-lobes short, ovate.....5. *tinctoria*.

Leaves usually ternately whorled:—

Leaves elliptic-lanceolate, more or less densely brown-pubescent as are the branchlets and inflorescence; stipules ovate, obtuse, sometimes bifid, often recurved; corolla-tube .2 in. long, slightly villous within; calyx-lobes and bracteoles short.....6. *Notoniana*.

Leaves narrowly lanceolate, nearly glabrous, the branchlets and inflorescence

softly pubescent; stipules triangular; corolla-tube .15 in. long, villous within; calyx-lobes and bracteoles long, linear.....7. *Lawii*.

1. *WENDLANDIA EXSERTA*, DC.; F. B. I. iii. 37; W. & A. 402.
N. Circars, Sál forests of Ganjam, not common.
A small often deciduous tree with ashy-grey foliage and fragrant white flowers. Bark brown; wood reddish-brown, hard, close-grained. Vern. *Hind.* Chaulai; *Ur.* Tilai; *Mar.* Til.
2. *WENDLANDIA GLABRATA*, DC.; F. B. I. iii. 39. *W. Heyneana*, Wall.; W. & A. 403.
N. Circars, hills of Ganjam Vizagapatam and Godavari, up to 4,500 ft.
A small tree, glabrous, with rather large white flowers and distantly and not prominently nerved leaves.
3. *WENDLANDIA BICUSPIDATA*, W. & A. 403. *W. Notoniana* var. *bicuspidata*, Hook. f.; F. B. I. iii. 40.
W. Gháts, hills of Travancore.
A small tree
4. *WENDLANDIA ANGUSTIFOLIA*, Wight; F. B. I. iii. 40.
Deccan, forests of Cuddapah (Beddome); W. Gháts, hills of Tinnevely, at Courtallum (Wight) and Kannikatti (Rangachari).
A small tree with narrow whorled leaves and compact flower panicles.
5. *WENDLANDIA TINCTORIA*, DC.; F. B. I. iii. 38.
N. Circars, hills of Ganjam; Deccan, from the Nallamalai forests of Kurnool to the Naggur hills in N. Arcot, not common.
A small tree with pubescent panicles and strongly nerved leaves.
6. *WENDLANDIA NOTONIANA*, Wall; F. B. I. iii. 40; W. & A. 403; Wt. Ic. t. 1033, Spic. Neilgh. t. 95; Bedd. Fl. t. 224.
Deccan, hills of Cuddapah Bellary and Coimbatore, above 3,000 ft.; W. Gháts, hills of S. Canara to the Nilgiris Pulneys and hills of Travancore, above 5,000 ft., Shevaroy hills.
A shrub or small tree, with leaves in whorls, the flowers pale yellow and fragrant. Bark orange red, fibrous; wood reddish brown, moderately hard. Vern. *Tam.* Kadamban; *Mal.* Puvu
7. *WENDLANDIA LAWII*, Hook. f.; F. B. I. iii. 40.
W. Gháts, Bababudan hills of Mysore (Law).
A small tree with flowers in large white-pubescent open panicles, the many slender bracteoles conspicuous.

8. *Hymenodictyon*, Wall.

Trees or shrubs with thick branches and bitter bark. *Leaves* petioled, deciduous; stipules interpetiolar, deciduous. *Flowers* small, in racemes or spikes in axillary or terminal panicles, with 1—2 large leafy reticulate persistent bracts; bracteoles linear or small or 0, deciduous. *Calyx*-tube short; lobes 5 or 6, small, deciduous. *Corolla*-tube slender, expanding in a campanulate 5-lobed limb; lobes valvate. *Stamens* 5, on the corolla limb; filaments short; anthers lanceolate, sagittate. *Ovary* 2-celled; ovules numerous, on placentas adnate to the septum; style long, slender; stigma capitate. *Fruit* a loculicidally 2-valved cap-

sule, the placentas at length free. *Seeds* many, imbricating upwards; testa reticulate with reticulate wings bifid below; albumen fleshy; cotyledons ovate; radicle cylindric.

Flowers pedicelled, in fascicles or umbellules on a thyrsoid panicle; corolla-tube elongate; leaves broadly-ovate, acuminate, pubescent on both sides; capsules pendulous; seeds broadly-winged, .5 in. long.....1. *excelsum*.
Flowers sessile, in elongate spikes; corolla-tube short; leaves elliptic or obovate, abruptly acuminate, glabrous or only little pubescent beneath; capsules erect; seeds narrowly-winged, .25 in. long.....2. *obovatum*.

1. HYMENODICTYON EXCELSUM, Wall.; F. B. I. iii. 35; W. & A. 392.
H. obovatum, Wt. Ic. t. 80, not of Wall.

N. Circars and Deccan, in deciduous forest; W. Gháts, in deciduous forests in Malabar and Travancore up to 1,500 ft.

A large deciduous tree with pale green flowers, large soft leaves and conspicuous reticulate bracts, the capsule valves persisting when leafless. Bark grey, soft; wood white when cut fresh, otherwise brownish-grey, not much used. Vern. *Hind.* Bhaulan; *Ur.* Bodoka; *Tel.* Dudippa; *Tam.* Vellei kadambu; *Mal.* Itthilei.

2. HYMENODICTYON OBOVATUM, Wall.; F. B. I. iii. 36; W. & A. 392; Wt. Ic. t. 1159; Bedd. Fl. t. 219.

W. Gháts, from S. Canara and Mysore to Travancore, in deciduous forests up to 4,000 ft.

A small or medium-sized tree with obovate, long-petioled leaves and white flowers, the capsules erect. Wood brownish-grey, soft. Vern. *Mar.* Kadwa-sirid.

Various species of *Cinchona* obtained from seed imported from S. America, are grown in Government and private plantations in the Nilgiri Hills in order to supply India with quinine. The chief species grown are *C. officinalis*, Hook., *C. Calisaya*, Wedd. and its var. *Ledge-riana*, and *C. succirubra*, Pavon.

9. *Dentella*, Forst.

A small prostrate herb. *Leaves* small; stipules connate, scarious. *Flowers* white, minute, solitary, axillary and in the forks of the dichotomous branches, sessile or pedicelled. *Calyx*-tube globose; limb tubular, 5-lobed, persistent. *Corolla* funnel-shaped, hairy within; lobes 5, 2—3-toothed. *Stamens* 5, in the middle of the corolla-tube; filaments short; anthers linear. *Ovary* 2-celled; ovules many, on hemispheric placentas; style short; stigmas filiform. *Fruit* small, dry, globose, indehiscent, 2-celled. *Seeds* many, minute, angular; testa punctulate.

DENTELLA REPENS, Forst.; F. B. I. iii. 42; W. & A. 405.

All plains Districts, in moist places, especially rice-fields.

A slender prostrate rooting herb with dichotomous branches.

10. *Argostemma*, Wall.

Small delicate herbs. *Leaves* usually membranous, in pairs or false whorls, the pairs often unequal; stipules interpetiolar, entire or wanting. *Flowers* white, in peduncled cymes or umbels. *Calyx*-tube short; lobes usually 5. *Corolla* rotate, 4—5-partite, valvate. *Stamens*

4—5, inserted on the corolla-tube; filaments short; anthers long, curved, at first connivent, dehiscing by terminal pores. *Ovary* 2-celled; ovules very many, on swollen placentas on the middle of the septum; style filiform; stigma capitellate. *Fruit* a 2-celled capsule, dehiscing at the apex or by an operculum. *Seeds* minute, angled or compressed; testa granulate or reticulate; embryo minute.

Flowers 4-merous, peduncles longer than the leaves; leaves broadly orbicular-ovate, obtuse or slightly acute.....1. *Courtallense*.

Flowers 5-merous, peduncles much shorter than the leaves; leaves lanceolate or ovate-lanceolate, acuminate.....2. *verticillatum*.

1. ARGOSTEMMA COURTALLENSE, Arn; F. B. I. iii. 42; Wt. Ic. t. 1160.

W. Ghâts, up to 3,000 ft. on rocks in shady places.

A small herb about 3—6 in. high, with broad leaves often up to 2·5 in. in diam.

2. ARGOSTEMMA VERTICILLATUM, Wall.; Pl. As. Rar. t. 185; F. B. I. iii. 43.

W. Ghâts, in the Anamalai Hills (Beddome).

A small delicate herb with narrow leaves up to 1·5 in. long, ·5 in. broad.

11. *Neurocalyx*, Hook.

Low herbs with rather short stems. *Leaves* membranous, entire or toothed, reticulate, crowded at the ends of the stems; stipules large, usually bifid. *Flowers* rather large, pale purple, in short axillary pendulous racemes; bracts simple or divided. *Calyx*-tube globose; lobes 5, broad, membranous, reticulate. *Corolla* rotate without tube; lobes 5, valvate, narrower than the calyx-lobes. *Stamens* 5; filaments very short; anthers connate in a conical tube, dehiscing inwards. *Ovary* 2-celled; ovules many, on peltate placentas; style filiform; stigma capitellate. *Fruit* coriaceous or fleshy, bursting irregularly. *Seeds* many, globose; testa muriculate; embryo small.

NEUROCALYX WIGHTII, Arn; F. B. I. iii. 47. *N. Hookeriana*, Wt. Ic. t. 52.

W. Ghâts, from S. Canara southwards, in moist places in evergreen forests at about 3,000 ft.

An almost woody-stemmed herb with crowded oblanceolate leaves 6—9 in. long, the flowers pale purple.

12. *Oldenlandia*, Plum.

Shrubs undershrubs or herbs, usually dichotomously branched. *Leaves* opposite, rarely ternately whorled; stipules interpetiolar, free or connate with the petioles, often pectinately or pinnatifidly fringed. *Flowers* white or pink, sometimes blue, in axillary or terminal, often paniculate, cymes, rarely solitary. *Calyx*-teeth 4, rarely 5, persistent. *Corolla* rotate campanulate or funnel-shaped; lobes 4, rarely 5, valvate. *Stamens* 4 or 5, in the throat of the corolla-tube, included or exserted. *Ovary* 2-celled; ovules numerous, on placentas attached to the septum; style filiform; stigmas 2, linear. *Fruit* a capsule, membranous or chartaceous, dehiscing septicidally, the cells splitting ventrally, or loculicidally in the upper part, or sometimes indehiscent. *Seeds* usually many,

in cavities on the rounded placentas, smooth or angular: testa usually reticulate or pitted: albumen fleshy.

Capsule indehiscent or late dehiscent or the crown only dehiscing loculicidally:—

Flowers in sessile or subsessile axillary cymes:—

Capsule indehiscent, hard, globose; leaves ovate to lanceolate, variable in length, prominently nerved; stipules short, membranous, hispid, with few erect teeth; flowers pedicellate.....1. *Auricularia*.

Capsule dehiscent at the top only:—

Capsule hard, crustaceous, ovoid; leaves lanceolate or ovate-lanceolate, rigid, midrib prominent, nerves indistinct; stipules with many long hair-like bristles; flowers sessile.....2. *nitida*.

Capsule soft, thin-walled; leaves small, ovate or orbicular, membranous, trinerved from the base; stipules very small with few slender processes; flowers shortly pedicelled.....3. *trinervia*.

Flowers sessile, axillary or in terminal few-flowered heads; capsule crustaceous, globose, late dehiscent; leaves linear-subulate, aristate; stipules truncate with about 5—6 pectinate bristles.....4. *caerulea*.

Capsule dehiscent septically, the 2 cocci dehiscing ventrally:—

Erect shrubs or undershrubs:—

Cymes in terminal panicles:—

Stipules triangular-ovate, the margins glandular, at any rate when young:—

Stipules glabrous, very glandular; calyx-lobes acute, short, recurved, villous; capsule ovoid; leaves lanceolate acuminate up to 4 in. long, the main nerves 6—12 pairs, very oblique.....5. *fruticosa*.

Stipules pubescent with few narrow pectinate teeth or glabrous and glandular; calyx-lobes less obtuse, glabrous, yellow, erect; capsule subcylindrical; leaves ovate or ovate-lanceolate, up to 3 in. long, main nerves usually 3—6 pairs, not very oblique.....6. *purpurascens*.

Stipules rounded, the margins simply pectinate, not usually glandular:—

Stipule-teeth elongate, subulate; foliage yellowish:—

Leaves coriaceous, sessile, narrowly lanceolate, the margins recurved, about 1 in. long, with closely-set thick nerves; capsule obovoid, glabrous; stipules nearly glabrous; flower-panicles large with long peduncles.....7. *articularis*.

Leaves thin, petioled, ovate-lanceolate, margins not recurved, up to 3 in. long, with few slender nerves; capsule subglobose, grey-pubescent; stipules pubescent; flower-panicles shortly peduncled.....8. *pruinosa*.

Stipule-teeth short, subulate; stiff shrub with small very coriaceous leaves scarcely 5 in. long, the margins recurved, nerves very obscure; capsule short, obovoid; cymes short, few-flowered.....9. *buxifolia*.

Stipules ovate, sharply toothed, strigosely villous; stiff shrubs with coriaceous elliptic-ovate leaves up to 1.5 in. long, the margins recurved, nerves strong; flowers in short capitate cymes, very hispid.....10. *Beddomei*.

Stipules elongate, the margins pinnatisect:—

Stipules pubescent:—

Stipule-teeth few, about 5—7, long, distant; leaves ovate or elliptic-lanceolate, acuminate, coriaceous, up to 4 in. long, margins recurved, usually glabrous; capsule ovoid, glabrous; calyx glabrous.....11. *stylosa*.

Stipule-teeth many, about 9—11, short, except the end ones, close; leaves lanceolate, acuminate, membranous, about 1.5 in. long, with about 3 pairs main nerves, hirsute; calyx pubescent.....12. *Bourdillonii*.

Stipules usually glabrous, glandular, with few filiform teeth:—

Leaves sessile, thick, glabrous, ovate, acute, yellow when dry, up to 3 in. long, main nerves 3—4 pairs, stipules all glabrous; flowers in large yellowish pubescent panicles of cymes; capsule globose, pubescent.....13. *swertioides*.

Leaves petioled, thin, glabrous, up to 7 in. long, main nerves about 8 pairs, stipules pubescent at first, then glabrous; flowers in nearly glabrous spreading panicles of cymes; capsule small, depressed-globose, glabrous.....14. *ovalata*.

Stipules, at any rate the lower ones, combined in a tubular scarious sheath, many-toothed on the margin:—

All stipules sheathing, large, .5 in. or even more long, the teeth subulate; leaves elliptic-ovate or lanceolate, acuminate, prominently nerved and plicate, up to 3 in. long (perhaps more, as in Ceylon specimens); cymes in large panicles, the flowers large, in umbellules, scarcely pedicelled, bracteolate, the bracts ovate; calyx-limb campanulate, .15 in. long

15. *Lessertiana*.

Lower stipules sheathing, .1—5 in. long, upper triangular dentate, the teeth few, subulate; leaves lanceolate acuminate, prominently nerved, up to 3 in. long, the nerves impressed above; cymes in small corymbose panicles, the flowers small, not umbellulate, with slender pedicels and linear bracteoles, the bracts lanceolate; calyx-limb campanulate, .05 in. long.....16. *anamalayana*.

Cymes axillary:—

Cymes pedunculate:—

Shrub with branches corrugated with stipular scars; stipules doubly pectinate, large, woolly; leaves elliptic-lanceolate, acuminate, hirsute, 1—3 in. long, .5—1 in. broad, crowded at the ends of the branchlets; cymes little longer than leaves.....17. *hirsutissima*.

Undershrubs with very pale leaves nearly or quite glabrous and whitish beneath:—

Stipules pinnatifid, .4 in. long, villous; leaves lanceolate, acuminate, up to 3 in. long, 1 in. broad, main nerves about 4—6 pairs, oblique; cymes stout, 3—4 in. long.....18. *sisaparensis*.

Stipules triangular, pectinately many-fringed, villous; leaves lanceolate, acuminate, up to 2 in. long by .5 in. broad, main nerves obscure, about 4 pairs; cymes slender, about 2 in. long, the calyx glabrous

19. *wynaadensis*.

Stipules ovate, pectinately fringed with black-gland-tipped teeth, glabrous; leaves lanceolate, acuminate, up to 3 in. long by 1 in. broad; main nerves about 6 pairs cymes short, crowded, nearly sessile, the calyx glabrous.....20. *albonervia*.

Cymes sessile, the flowers fascicled:—

Stipules ovate, pectinate, with many softly villous long teeth; pedicels slender, the calyx-tube glabrous, lobes lanceolate; corolla-tube funnel-shaped; stamens exsert with long filaments; leaves elliptic or ovate up to 2 in. long, 1 in. broad, with about 5 pairs main nerves, yellow when dry.....21. *villosostipulata*.

Stipules triangular, pectinate, with about 7 curved teeth, villous only at tip; pedicels slender, the calyx-tube hirsute, lobes linear; corolla-tube slender; stamens nearly sessile; leaves elliptic or lanceolate, up to 4 in. long, 1.5 in. broad, with about 7—9 pairs main nerves

22. *Ramarowii*.

Stipules triangular-ovate, pectinate, with linear glandular teeth; pedicels 0, the calyx-tube short, glabrous, the lobes oblong; corolla-tube cylindrical; stamens nearly sessile; leaves oblong-lanceolate, up to 5 in. long, 1.25 in. broad, with about 6 pairs of inconspicuous main nerves

23. *membranacea*.

Stipules orbicular, glandular on the margins and on a ring at the middle inside, when old white and scarious; leaves ovate, sessile, very coriaceous and with much thickened margins, the nerves obscure, up to 1 in. long, .5 in. broad; cymes sessile in the axils of upper leaves, 3-flowered, with minute linear bracteoles; calyx-lobes lanceolate, curved

24. *Barberi*.

Cymes capitate, in axillary bracteate whorled scapes; short-stemmed marsh herbs with many large, close, erect leaves in a rosette; scapes about as long as the leaves, the calyx glabrous with long linear lobes.....25. *verticillaris*.

Flowers solitary, axillary, on slender pedicels; stipules rounded, pectinate, scurfy, thickened below; leaves small, 1—1.5 in. long, elliptic, acuminate, the main nerves obscure, about 4 pairs.....26. *travancorica*.

Flowers in axillary and terminal loose corymbs; leaves ovate to linear-lanceolate, long-acuminate, long-petioled, membranous, up to 5 in. long; stipules triangular, gland-toothed and viscid; capsule globose, glabrous

27. *viscida*.

Climbing almost shrubby herb; crown of capsule opening loculicidally at top; flowers in lateral or terminal cymes of umbels; leaves sessile, lanceolate, long-acuminate, faintly few-nerved, glabrous, up to 5 in. long, 1 in. broad; stipules connate in a bicuspidate cup.....28. *scandens*.

Capsule dehiscent loculicidally in the upper part, sometimes nearly to the base:—

Capsule terete; seeds minute, angular, testa reticulate:—

Corolla-tube usually short:—

Peduncles axillary, 1—4-flowered:—

Leaves linear, narrow; bases of calyx-teeth not touching in fruit:—

Capsule valves short; corolla-tube short and broad; diffuse herbs:—

Flowers pedicelled, usually in pairs or threes.....29. *corymbosa*.

Flowers sessile or nearly so, solitary.....30. *diffusa*.

Capsule valves elongate; corolla-tube slender; erect herbs

31. *herbacea*.

Leaves elliptic or elliptic-lanceolate; bases of calyx-teeth touching in fruit; peduncles 1—2-flowered; diffuse herb.....32. *crystallina*.

Peduncles from upper axils, umbellate, many-flowered:—

Calyx-teeth short, subulate; capsule rounded; leaves narrow, rough

33. *umbellata*.

Calyx-teeth long, lanceolate; capsule depressed; leaves rather broad, very scabrid.....34. *Wightii*.

Peduncles partly axillary, partly in terminal paniced cymes; pedicels filiform:—

Stem sharply angled; leaves linear, stiff; flowers very small, calyx-lobes minute.....35. *pusilla*.

Stem terete or nearly so; flowers rather large, corolla up to .25 in. long:—

Corolla campanulate, white or pale blue, with narrow tube, stamens included; calyx-lobes small; leaves linear-lanceolate, membranous, pale.....36. *dichotoma*.

Corolla campanulate, blue, with broad tube, stamens exerted, calyx-lobes large with a bristle in the sinus; leaves linear-subulate, stiff

37. *Stocksii*.

Peduncles 1-flowered, terminal and axillary; corolla-tube slender, .2—3 in. long; stamens exerted; calyx-lobes small, lanceolate; leaves ovate or ovate-lanceolate, very small.....38. *Prainiana*.

Corolla-tube slender, cylindric or funnel-shaped; erect herbs with narrow leaves and terminal cymes:—

Corolla-tube long and slender; anthers included:—

Leaves in fascicled whorls; calyx and short and broad capsules scabrous

39. *aspera*.

Leaves not fascicled; calyx and elongate capsules glabrous...40. *gracilis*.

Corolla-tube rather short, slender; anthers exerted; leaves linear-lanceolate, the margins recurved:—

Flowers in long slender branching subracemose cymes; leaves glabrous

41. *stricta*.

Flowers in short close cymes; leaves scabrid.....42. *Shuteri*.

Capsule 4-angled or -winged; seeds hardly angled, testa pitted:—

Branching herbs with leaves throughout, the leaves elliptic, narrowed at the base:—

Capsule 4-angled; flowers in racemose panicles; calyx-lobes short, triangular.....43. *biflora*.

Capsule 4-winged; flowers in subcapitate cymes; calyx-lobes broad and much produced.....44. *alata*.

Erect small herbs with single stem 1—2 in. long, followed by a whorl of rather large membranous leaves, from which come the slender long-peduncled cymes; fruit hemispheric, obscurely 4-sided.....45. *nudicaulis*.

1. OLDENLANDIA AURICULARIA, K. Schum. *Hedyotis Auricularia*, Linn.; F. B. I. iii. 58; W. & A. 412; Bedd. Ic. t. 27.
Circars, Deccan and Carnatic, in hilly country; W. Gháts and W. Coast from S. Canara southwards at low levels.
An annual, usually trailing, herb, in open places the leaves ovate and short, in shady ones lanceolate and up to 3 in. long; flowers white.
2. OLDENLANDIA NITIDA, Gamble n. comb. *Hedyotis nitida*, W. & A. 412; F. B. I. iii. 61. *H. glabella*, Bedd. Ic. t. 36.
Hills of the N. Circars; W. Gháts, at low levels from S. Canara southwards.
An annual usually prostrate herb with stiff leaves.
3. OLDENLANDIA TRINERVIA, Retz; F. B. I. iii. 66. *Hedyotis trinervia*, W. & A. 414; Bedd. Ic. t. 29.
E. and W. Coast, in damp places, from Madras and S. Canara southwards.
A small annual prostrate herb.
4. OLDENLANDIA CÆRULEA, Gamble n. comb. *Hedyotis coerulea*, W. & A. 412; Bedd. Ic. t. 30.
E. Coast, Rambha in Ganjam, Nellore to Tanjore, on coast sands; W. Coast, in S. Canara.
An annual, stiff, erect, scabrous herb, the flowers blue.
5. OLDENLANDIA FRUTICOSA, K. Schum. *Hedyotis fruticosa*, Linn.; F. B. I. iii. 49; W. & A. 408.
W. Gháts, hills of Travancore, at low levels up to 3,000 ft.
An erect shrub.
6. OLDENLANDIA PURPURASCENS, O. Kze. *Hedyotis purpurascens*, Hook. f.; F. B. I. iii. 50. *H. purpurea*, Bedd. Ic. t. 5.
W. Gháts, hills of Travancore and Tinnevely.
A large erect shrub with beautiful and conspicuous purple flowers.
Var. *pallida*, Gamble, paler in colour with shorter ovate acuminate leaves and glabrous glandular stipules.
Sivagiri hills of Tinnevely (Wight).
7. OLDENLANDIA ARTICULARIS, Gamble n. comb. *Hedyotis articularis*, Br.; F. B. I. iii. 51; W. & A. 437; Wt. Ic. t. 1028.
W. Gháts, Sholas of the Nilgiris above 6,000 ft., less common in Anamalais, Pulneys and Palghát Hills.
A stiff shrub with coriaceous yellowish leaves and lilac flowers; the stipules are rather variable, generally rounded, but sometimes triangular elongate, but the plant is easily recognised.
8. OLDENLANDIA PRUINOSA, O. Kze.; *Hedyotis pruinosa*, W. & A. 408; F. B. I. iii. 51. *H. lentiginosa*, Bedd. Ic. t. 6.
W. Coast, in Malabar and Travancore, along backwaters.
A shrub with yellowish-pubescent thin leaves and spreading flower panicles.
9. OLDENLANDIA BUXIFOLIA, O. Kze. *Hedyotis buxifolia*, Bedd. Ic. t. 1; F. B. I. iii. 52.
W. Gháts, higher ranges of the Anamalais, above 7,000 ft.
A stiff shrub with small, very coriaceous leaves.

10. OLDENLANDIA BEDDOMEI, O. Kze. *Hedyotis Beddomei*, Hook. f. in F. B. I. iii. 52. *H. capitata*, Bedd. Ic. t. 191.
W. Gháts, Palghat hills of Malabar, in open grassy places at 6,500 ft.
A stiff shrub with white-barked nodose stems, the leaves yellow when dry.
11. OLDENLANDIA STYLOSA, O. Kze. *Hedyotis stylosa*, Br.; F. B. I. iii. 51; W. & A. 407; Wt. Ic. t. 1027, Spic. Neilgh. t. 93.
W. Gháts, margins of Sholas and on open downs in the Nilgiris Pulneys and hills of Mysore above 5,000 ft., common.
A large shrub with blue-purple or lilac-tinged white flowers.
12. OLDENLANDIA BOURDILLONII, Gamble in Kew Bull. 1919, 404.
W. Gháts, hills of Travancore, in scrub at 2,000—4,000 ft.
A small shrub reaching 4 ft. in height.
13. OLDENLANDIA SWERTIOIDES, O. Kze. *Hedyotis swertioides*, Hook. f.; F. B. I. iii. 51.
W. Gháts, on the downs of the Pulney Hills, at high levels, south to Travancore Hills.
A low shrub with lilac or white flowers—"Ground Lilac (Fyson)."
14. OLDENLANDIA EUALATA, Gamble in Kew Bull. 1919, 404. *Hedyotis eualata*, Bedd. M.S. in Herb. Kew.
W. Gháts, Anamalais and hills of Tinnevely at 4,000—5,000 ft. (Beddome); Pykara Falls in Nilgiris at 5,000 ft. (Lawson).
A weak shrub with small flowers in many-bracteolate panicles, the leaves large.
15. OLDENLANDIA LESSERTIANA, O. Kze. *Hedyotis Lessertiana*, Arn.; F. B. I. iii. 52; Trimen Fl. Ceyl. t. 49.
W. Gháts, Anamalai Hills (Beddome).
A stout erect shrub with white flowers and conspicuous scarious tubular stipules, the leaves thick and plicate.
16. OLDENLANDIA ANAMALAYANA, Gamble in Kew Bull. 1920, 67. *Hedyotis Lessertiana*, Bedd. Ic. t. 31, not of Arn.
W. Gháts, Anamalai Hills (Beddome) in higher ranges.
A slender erect undershrub with apparently white flowers.
17. OLDENLANDIA HIRSUTISSIMA, O. Kze. *Hedyotis hirsutissima*, Bedd. Ic. t. 2; F. B. I. iii. 55.
W. Gháts, in W. Nilgiris at about 7,000 ft.
A shrub with stout stems and pale lilac flowers.
18. OLDENLANDIA SISAPARENSIS, Gamble n. comb. *Hedyotis sisaparensis*, Gage in Journ. As. Soc. Beng. 1905, 244.
W. Gháts, in W. Nilgiris above Sispara at 7,000 ft.
An undershrub with quadrangular branches and pale leaves.
19. OLDENLANDIA WYNAADENSIS, Gamble in Kew Bull. 1919, 405.
W. Gháts, Chembra peak forests, Wynaad, 4,500—6,000 ft. (Beddome).
A very large shrub (Beddome) with pale leaves, slightly bluish.
20. OLDENLANDIA ALBO-NERVIA, Gamble n. comb. *Hedyotis albo-nervia*, Bedd. Ic. t. 3; F. B. I. iii. 55.
W. Gháts, hills of Tinnevely and Travancore at 3,000—4,000 ft.
A glabrous pale undershrub.

21. *OLDENLANDIA VILLOSOSTIPULATA*, Gamble in Kew Bull. 1919, 405.
W. Gháts, hills of Travancore.
A bush reaching 4 ft. in height.
22. *OLDENLANDIA RAMAROWII*, Gamble in Kew Bull. 1919, 405.
W. Gháts, at Ponmudi, hills of Travancore (M. Rama Row);
at Chimunji, 4,000 ft. (Bourdillon).
An undershrub with rather thick soft stems and parallel-nerved leaves.
23. *OLDENLANDIA MEMBRANACEA*, O. Kze. *Hedyotis membranacea*, Thw.; F. B. I. iii. 54.
W. Gháts, at Kunjyar in Travancore.
A slender pale undershrub with obtusely 4-angled stems and flowers in sessile axillary whorls.
24. *OLDENLANDIA BARBERI*, Gamble in Kew Bull. 1920, 68.
W. Gháts, Agastiamalai in Tinnevelly District, about 5,000 ft. (Barber).
An erect shrub with woody ringed branches, small leathery leaves closely packed at their top and prominent white stipules.
25. *OLDENLANDIA VERTICILLARIS*, O. Kze. *Hedyotis verticillaris*, W. & A. 409; F. B. I. iii. 56; Wt. Ic. t. 1029, Spic. Neilgh. t. 94.
W. Gháts, Nilgiris, on the banks of the Pykara River at 6,000—7,000 ft.
A remarkable species with a large rosette of long parallel-ribbed leaves mixed with verticillate flower scapes; flowers lilac. It is often stemless, flat on the ground, but sometimes the stem elongates, covered densely with dry stipules.
26. *OLDENLANDIA TRAVANCORICA*, O. Kze. *Hedyotis travancorica*, Bedd. Ic. t. 7; F. B. I. iii. 55.
W. Gháts, hills of Travancore and Tinnevelly at 3,000—4,000 ft.
A small undershrub with solitary flowers and white branchlets.
27. *OLDENLANDIA VISCIDA*, O. Kze. *Hedyotis viscida*, Bedd. Ic. t. 4; F. B. I. iii. 57.
W. Gháts, hills of Tinnevelly, in the beds of mountain streams at 3,000 ft. (Beddome, Barber).
• A large handsome shrub with slender branches.
28. *OLDENLANDIA SCANDENS*, K. Schum. *Hedyotis scandens*, F. B. I. iii. 57.
Travancore, without locality (Calder and Ramaswami).
A North-Indian plant with thin leaves.
29. *OLDENLANDIA CORYMBOSA*, Linn.; F. B. I. iii. 64. *Hedyotis Burmaniana*, Br.; W. & A. 415.
In all Districts, both on dry and wet lands; a common weed.
A variable annual herb, sometimes erect, sometimes, especially in wet places, prostrate and rooting; flowers white.
30. *OLDENLANDIA DIFFUSA*, Roxb.; F. B. I. iii. 65.
Most Districts, chiefly near the coast.
A prostrate annual herb, often rooting at the nodes.

31. OLDENLANDIA HERBACEA, Roxb. *O. Heynii*, Hook. f. F. B. I. iii. 65. *Hedyotis Heynii*, W. & A. 416.
In most Districts, both in the plains and in hilly country.
An erect bushy annual or biennial herb; flowers white.
32. OLDENLANDIA CRYSTALLINA, Roxb.; F. B. I. iii. 65. *Hedyotis pumila*, Linn. f.; W. & A. 414.
E. Coast, Madras to Negapatam; W. Coast, in Travancore, scarce.
A prostrate annual herb.
33. OLDENLANDIA UMBELLATA, Linn.; F. B. I. iii. 66; Roxb. Cor. Pl. t. 3. *Hedyotis umbellata*, Lamk.; W. & A. 413.
Circars, Deccan and Carnatic, in dry places, especially on coast sands; "Chay-root."
A stiff biennial or perennial herb with lilac flowers, of considerable value, the bark of the root giving a valuable red dye. It is often cultivated. Vern. *Tel.* Cherivelu; *Tam.* Saya.
34. OLDENLANDIA WIGHTII, Hook. f.; F. B. I. iii. 66.
Deccan, on dry red soil lands.
A stiff herb much resembling the last, perhaps not really distinct.
35. OLDENLANDIA PUSILLA, Rottl. *O. brachiata*, Hook. f.; F. B. I. iii. 66. *Hedyotis brachiata*, Wt.; W. & A. 415.
Carnatic, in Trichinopoly (Wight).
A stiff, erect, bushy herb.
36. OLDENLANDIA DICHOTOMA, Koen.; F. B. I. iii. 67. *Hedyotis dichotoma*, W. & A. 416 in part.
N. Circars and Deccan, in hilly country up to 4,500 ft., usually on rocks.
A slender, pretty, erect herb with long hair-like pedicels.
37. OLDENLANDIA STOCKSII, Hook. f. & Th.; F. B. I. iii. 67.
Deccan, in the Bababudan hills of Mysore at 6,000 ft. (Stocks, Talbot).
A slender, much tufted annual with blue flowers, growing apparently among grass, 4—8 in. high.
38. OLDENLANDIA PRAINIANA, Craib in Kew Bull. 1910, 278. *Anotis Prainiana*, Talb. in Journ. Bomb. Nat. Hist. Soc. xi, 237, t. 6.
Deccan, in the Bababudan hills of Mysore (Talbot, Meebold), in dry rocks or fissures.
A small, moss-like, diffuse branching herb rooting at the nodes, with white or pinkish-white flowers and rather large pitted seeds.
39. OLDENLANDIA ASPERA, DC.; F. B. I. iii. 68. *Hedyotis aspera*, W. & A. 417.
Deccan, on dry stony lands in Cuddapah, Anantapur, Bellary and Coimbatore.
A stout annual herb with white flowers.
40. OLDENLANDIA GRACILIS, DC.; F. B. I. iii. 68. *Hedyotis aspera*, Bedd. Ic. t. 32.
Carnatic, in Tinnevely and S. Travancore; Deccan, in Coimbatore hills at 4,000 ft.
A slender erect herb.

41. OLDENLANDIA STRICTA, Linn.; F. B. I. iii. 68. *Hedyotis maritima*, W. & A. 417.
E. Coast, on sandy seashore lands from Nellore southwards.
A tall, wiry annual herb.
42. OLDENLANDIA SHUTERI, Hook. f. in F. B. I. iii. 69.
E. Coast, near Madras (Shuter).
An annual erect scabrous herb.
43. OLDENLANDIA BIFLORA, Linn.; F. B. I. iii. 70. *O. paniculata*, Burm. f.; F. B. I. iii. 69, not of Linn. *Hedyotis biflora*, W. & A. 413. *H. racemosa*, Lam.; W. & A. 414; Wt. Ic. t. 312.
Plains Districts of the E. Coast, common; less so on W. Coast.
A diffuse annual glabrous almost succulent weed with white flowers.
44. OLDENLANDIA ALATA, Koen.; W. & A. 413; F. B. I. iii. 70.
N. Circars and Carnatic (Campbell, Wight) in the plains westward to Coimbatore; W. Coast, in Travancore.
A stout annual weed.
45. OLDENLANDIA NUDICAULIS, Roth; F. B. I. iii. 70. *Hedyotis nudicaulis*, W. & A. 416; Bedd. Ic. t. 34.
N. Circars, in Ganjam Sál forests (Gamble); W. Gháts in the Anamalais up to 2,500 ft., Wynaad, Pulneys and Travancore hills.
An annual herb much resembling *Mollugo nudicaulis*, found in forest undergrowth.

13. Anotis, DC.

Herbs, prostrate or ascending, rarely erect, often with flaccid hairs. *Leaves* opposite: stipules interpetiolar, usually pectinate, and sometimes glandular. *Flowers* small, in axillary and terminal cymes or heads. *Calyx*-tube short; lobes 4, erect or recurved, with usually broad sinuses. *Corolla* tubular or funnel-shaped; lobes 4, valvate. *Stamens* 4, on the mouth of the corolla; anthers included or exserted. *Ovary* 2- rarely 3-4-celled; style filiform; stigmas linear; ovules usually few on placentas arising from near the base of the septum. *Fruit* a 2- rarely 3- or 4-celled capsule, rarely indehiscent, usually loculicidal, rarely septicidal; cells 1- or more- but usually few-seeded. *Seeds* peltate, boat-shaped or plano-convex: testa pitted; embryo clavate in horny albumen.

Capsule dehiscent loculicidally; seeds excavated on one face:—

Flowers in cymes:—

Cymes dense-flowered, usually strigosely villous as are the leaves:—
Leaves lanceolate; corolla-tube broad, 4—5 in. long; erect herbs

1. *longiflora*.
Leaves ovate; corolla-tube narrow, under 25 in. long; straggling diffuse herbs rooting at the nodes.....2. *Leschenaultiana*.

Cymes loose-flowered, glabrous or sparingly hairy:—

Erect perennial herbs with terete stems; capsule not much exserted:—
Capsule subglobose, the cells 1—3-seeded; calyx-lobes triangular

3. *decipiens*.
Capsule broader than long, the cells 2—4-seeded; calyx-lobes lanceolate
4. *lanceifolia*.

Erect annual herbs with quadrangular stems and filiform pedicels:—

Capsule much protruded, many-seeded, seeds cup-shaped; calyx-lobes minute; leaves minutely hairy.....5. *Rheedii*.
 Capsule little protruded, many-seeded, seeds flat, reticulate; calyx-lobes small, lanceolate; leaves glabrous.....6. *calycina*.

Flowers in clusters:—

Capsule usually 3- or 4-celled; annual herbs with membranous leaves and slender branches, the flowers usually 2—4 together.....7. *quadrilocularis*.

Capsule 2-celled:—

Leaves fleshy; calyx-lobes long and slender; capsule very little protruded.....8. *carnosa*.

Leaves membranous; capsules much protruded, broader than long:—

Leaves ovate or lanceolate, the branchlets hispid; capsule cells 1—3-seeded.....9. *Montholoni*.

Leaves linear, the branchlets glabrous; capsule cells 5-seeded.....10. *foetida*.

Capsule dehiscent septically, the cells 1—2-seeded; seeds excavated on one face; leaves membranous, ovate-lanceolate, long-petioled.....11. *monosperma*.

Capsule indehiscent, compressed, the cells 1—2-seeded; seeds flat, not excavated; leaves small, ovate, sessile or subsessile.....12. *Wightiana*.

1. *ANOTIS LONGIFLORA*, Hutch. in Kew Bull. 1916, 35.

W. Gháts, Pulney Hills at 6,000—7,000 ft., margins of Shola forest.

An erect perennial with white (Bourne) flowers.

2. *ANOTIS LESCHENAULTIANA*, Benth. & Hook. f.; F. B. I. iii. 72.

Hedyotis Leschenaultiana, W. & A. 411; Wt. Ill. t. 125.

W. Gháts, common on the downs at 4,000—7,000 ft., usually in wet places.

A tufted perennial with pink or blue-purple flowers and unpleasant scent, the stems rooting at the nodes.

Var. *affinis*, Hook. f. *Hedyotis affinis*, W. & A. 411; Wt. Ic. t. 1030.

A plant of smaller size with villous stems and smaller often purple corymbs; very bad smelling.

Nilgiri and Pulney Hills at high elevations, common.

Var. *deltoidea*, Hook. f.; *Hedyotis deltoidea*, W. & A. 410. A still

smaller form, often nearly glabrous, the leaves sometimes lanceolate and the plant slender.

Nilgiri Hills (C. B. Clarke); Pulneys (Wight, etc.).

3. *ANOTIS DECIPIENS*, Hook. f.; F. B. I. iii. 72.

W. Gháts, Pulneys and hills of Travancore and Tinnevely.

A slender perennial, rooting at the lower nodes, the upper stems erect.

4. *ANOTIS LANCIFOLIA*, Hook. f.; F. B. I. iii. 73.

W. Gháts, hills of Mysore.

5. *ANOTIS RHEEDII*, Benth. & Hook. f.; F. B. I. iii. 73.

W. Coast and W. Gháts, hills of S. Canara and Mysore to Cochin and Anamalais.

A slender annual herb with filiform pedicels and quadrangular stems.

6. *ANOTIS CALYCINA*, Wall.; F. B. I. iii. 73.

E. Gháts, Mahendragiri Hill in Ganjam, 4,000 ft. (Fischer).

A slender annual glabrous herb.

7. ANOTIS QUADRILOCULARIS, Benth. & Hook. f.; F. B. I. iii. 74.
Hedyotis quadrilocularis, Thw.: Bedd. Ic. t. 28.
W. Gháts, Bababudan Hills of Mysore at 6,000 ft.; hills of Travancore and Tinnevely, rare in Nilgiris, often in rock crevices.
An erect annual, remarkable for its 3—4-celled capsule.
8. ANOTIS CARNOSA, Benth. & Hook. f.; F. B. I. iii. 74.
W. Coast, on the sea shore in S. Canara (Hohenacker, Law).
A fleshy diffuse annual.
9. ANOTIS MONTHOLONI, Hook. f.; F. B. I. iii. 73.
W. Gháts, from Mysore and Canara (Law) to Malabar (de Montbolon).
10. ANOTIS FOETIDA, Benth. & Hook. f.; F. B. I. iii. 74.
W. Coast, on stony ground, S. Canara (Hohenacker).
A slender wiry annual with linear leaves.
11. ANOTIS MONOSPERMA, Benth. & Hook. f.; F. B. I. iii. 75. *Hedyotis monosperma*, Wt. Ic. t. 1031.
W. Gháts, Nilgiris and Pulneys at about 7,000 ft., in shady places in Shola forests; Bababudan Hills of Mysore.
A much-branched slender plant with small flowers.
12. ANOTIS WIGHTIANA, Benth. & Hook. f.; F. B. I. iii. 75.
W. Gháts, in the Nilgiris at 6,000—8,000 ft., in wet places.
A small, close-growing, perennial, tufted, villous herb with white, blue or purplish flowers.

14. Ophiorrhiza, Linn.

Erect, creeping or decumbent small herbs, rarely undershrubs. *Leaves* opposite; stipules interpetiolar, caducous. *Flowers* white pink or greenish, secund on the branches of axillary or terminal dichotomous cymes; bracts and bracteoles various, sometimes early caducous or 0. *Calyx*-tube short; lobes 5, small, persistent. *Corolla* tubular or funnel-shaped; lobes 5, valvate, often winged at the back, sometimes with a fold in the sinus. *Stamens* 5, inserted on the corolla-tube; filaments slender; anthers linear. *Disk* of 2 large lobes, erect in fruit. *Ovary* 2-celled; ovules many, on basal ascending placentas; style filiform; stigmas 2, linear or flattened. *Fruit* a compressed obcordate coriaceous capsule, girt by the calyx limb; the crown dehiscent by two broad gaping valves; placentas divaricate, many-seeded. *Seeds* minute, angled; testa crustaceous; albumen fleshy; embryo clavate.

Bracteoles none; cymes subumbellate, minutely rusty-puberulous, spreading and flat-topped, up to 3 in. diam. in fruit; leaves elliptic or elliptic-lanceolate, acuminate at apex, long-attenuate at base, 2—6 in. long, long-petioled; stipules of 2 slender teeth with small glands between; corolla short, under .5 in. long; capsule glabrous.

1. *Mungos*.

Bracteoles small and deciduous:—

Bracteoles very short:—

Small, procumbent, soft herbs, the leaves pale beneath, obtuse or slightly acute at apex, usually rounded at base, 1—3.5 in. long, 6—9-nerved; cymes small, under 1 in. in diam.; capsules glabrous or pubescent.....2. *Harrisiana*.
Small erect undershrub, the small leaves pale beneath, acute at apex, cuneate and decurrent at base, 7—8-nerved, 1—1.25 in. long; cymes small, few-flowered, .5 in. in diam.....3. *pykarensis*.

Erect undershrub with lanceolate, caudate-acuminate leaves 3.5—5.5 in. long; cymes lax and slender, 1—1.5 in. in diam.; capsule small, emarginate

4. *Barberi*.

Bracteoles linear or filiform:—

Corolla-tube short, under .25 in. long:—

Glabrous except the cymes and capsules, which are slightly tawny puberulous; leaves elliptic or elliptic-ovate, membranous, pale beneath, acuminate at apex, attenuate at base into the often long petiole; stipules often bifid; erect, slender undershrub with woody stem, the bracteoles subpersistent.

5. *Brunonis*.

Rusty-pubescent, especially the cymes and capsules; leaves ovate-lanceolate, pale beneath, acute or acuminate at apex, slightly attenuate at base into the often long petiole; stipules very villous; undershrubs usually rooting below and curving upwards.....6. *hirsutula*.

Corolla-tube over 1 in. long; cymes contracted; leaves membranous, elliptic-lanceolate, acuminate:—

Glabrous except the slightly pubescent corolla-tube; bracteoles filiform, often 1 in. long; stipules small, lanceolate, very caducous; leaf-nerves distant, about 6—8 pairs.....7. *grandiflora*.

Branchlets, leaf-nerves beneath, cymes and capsule pubescent; bracteoles linear, nearly glabrous, sometimes toothed; stipules ovate-oblong, large and broad, often bifid; leaf-nerves moderately close, about 8—10 pairs.

8. *Roxburghiana*.

Cymes conspicuously villous, including the filiform bracteoles and capsule, branchlets pubescent; stipules narrowly lanceolate, long, often bifid; leaf-nerves close, 10—16 pairs.....9. *eriantha*.

Bracteoles large and persistent, oblong- or linear-lanceolate, glabrous:—

Stipules narrowly acuminate from a broad base; cymes dense, the bracteoles oblong-lanceolate; leaves elliptic-lanceolate, long acuminate, sometimes narrow and linear-lanceolate, green beneath.....10. *pectinata*.

Stipules broadly ovate, acute; cymes loose, the bracteoles lanceolate-acuminate; leaves lanceolate, long-acuminate, glaucescent beneath.....11. *codyensis*.

1. *OPHIORRHIZA MUNGOS*, Linn.; F. B. I. iii. 77; W. & A. 404.
W. Gháts, from Wynaad to the Anamalais and the hills of Travancore and Tinnevely, at low levels, in evergreen forest.
A herbaceous undershrub with white flowers.
2. *OPHIORRHIZA HARRISIANA*, Heyne in W. & A. 405; F. B. I. iii. 78, var. 1 only. *O. Harrisonii*, Wt. Ic. t. 1162.
W. Gháts, Bolampatti hills of Coimbatore, hills of Malabar, Tinnevely and Travancore, in forest undergrowth, up to about 5,000 ft.
A low, soft, herbaceous plant with white or pinkish flowers, rooting from the lower nodes, the leaves usually obtuse, the capsules generally glabrous.
3. *OPHIORRHIZA PYKARENSIS*, Gamble in Kew Bull. 1919, 407.
Nilgiri Hills, at Pykara Falls, 6,000 ft. (Gamble).
An erect slender undershrub with small leaves and pale blue or lilac flowers.
4. *OPHIORRHIZA BARBERI*, Gamble in Kew Bull. 1919, 406.
W. Gháts, in the Anamalai and Travancore Hills, about 3,000 ft. (Barber, Venkoba Rao)
An erect slender undershrub with lax glabrous cymes of pretty flowers.
5. *OPHIORRHIZA BRUNONIS*, W. & A. 404; F. B. I. iii. 79. *Hedyotis Lawsoniae*, Wt. Ic. t. 1026 probably.

W. Gháts, in the Nilgiri Hills above 5,000 ft., in Shola Forest undergrowth.

An erect, slender undershrub, variable, probably according to the amount of shade; flowers white or lilac.

Var. *Johnsoni*, Hook. f. Corolla-tube long and slender, 5—7 in. long, more villous.

Cochin, probably in the mountains (Johnson).

6. *OPHIORRHIZA HIRSUTULA*, Wight; F. B. I. iii. 81. *O. Brunonis*, W. & A. var. *hirsutior*, Hook. f.; F. B. I. iii. 80.

W. Gháts, from S. Canara, Coorg and the Bababudan hills of Mysore to the Nilgiris and the hills of Travancore at 3,000—7,000 ft., in forest undergrowth; E. Gháts, Aralagudem Ghát, Vizagapatam, 3,200 ft. (A. W. Lushington). An undershrub, variable in size of leaf and length of petiole, also pubescence, probably according to the amount of shade. The S. Canara, Coorg and Mysore form is more slender and glabrous than the Nilgiri one, probably on account of a drier climate.

7. *OPHIORRHIZA GRANDIFLORA*, Wt. Ic. t. 1069; F. B. I. iii. 80.

W. Gháts, Sivagiri and Naterikal hills of Tinnevely.

An erect undershrub with large flowers.

8. *OPHIORRHIZA ROXBURGHIANA*, Wt. Ic. t. 1068; F. B. I. iii. 81.

W. Gháts, in the Pulney Hills (Wight), Periyar Shola (Bourne).

An erect undershrub with conspicuous flowers.

9. *OPHIORRHIZA ERIANTHA*, Wt. Ic. t. 1067; F. B. I. iii. 81.

W. Gháts, at Courtallum in Tinnevely (Wight); Travancore, at Peermard (Beddome).

An erect undershrub, the large flowers very villous.

10. *OPHIORRHIZA PECTINATA*, Arn.; F. B. I. iii. 81.

W. Gháts, in Malabar, Anamalais, Tinnevely and Travancore, at about 3,000 ft.

An erect undershrub, the leaves sometimes quite narrow.

11. *OPHIORRHIZA CODYENSIS*, Gamble in Kew Bull. 1919, 406.

Coorg, at Sampaji Ghát (Bourne).

An erect undershrub, the lower nodes sometimes rooting.

15. *Mussaenda*, Linn.

Shrubs or undershrubs, rarely herbs, erect or climbing. *Leaves* opposite or ternately whorled; stipules solitary or in pairs between the petioles. *Flowers* fairly large, in terminal cymes; bracts and bracteoles deciduous. *Calyx*-tube oblong or turbinate; lobes 5, usually deciduous, one lobe often transformed into a large petioled white or coloured leaf. *Corolla* tubular, funnel-shaped above, villous in the throat; lobes 5, valvate, usually apiculate. *Stamens* 5 on the throat of the corolla-tube or in the tube; filaments short; anthers linear. *Ovary* 2-celled; ovules numerous, on peltate fleshy placentas; style filiform, stigmas 2, linear. *Fruit* a fleshy berry, arcolate on the top, many-seeded. *Seeds* minute; testa pitted; embryo minute, in fleshy albumen.

Calyx-lobes equal, not enlarged and leaf-like; branchlets and leaves beneath densely softly white-tomentose; stipules of 2 subulate teeth 3 in. long from a

broad short base; corolla-tube .8—1 in. long, the limb 1 in. in diam.; berry .25 in. diam., globose, strigosely hairy.....1. *tomentosa*.
One calyx-lobe often much enlarged and leaf-like:—

Branchlets nearly glabrous except at nodes; leaves glabrous above, minutely villous only on nerves beneath, the nerves conspicuous, the transverse nervules parallel; stipules .2 in. long, shortly bifurcated near the top; corolla-tube above 1 in. long, the limb .5—6 in. in diam.; berry obovoid, .4—5 in. long, glabrous.....2. *glabrata*.

Branchlets and leaves softly hairy:—

Inflorescence very lax; leaves loosely pubescent beneath, broadly ovate, abruptly acuminate at apex, the transverse nervules not prominently parallel; stipules about .3 in. long, bifurcated about half-way down, the teeth curved outwards; corolla-tube above 1 in. long, the limb up to .75 in. broad; berry obovoid, .4—5 in. long, sparsely hirsute.....3. *laxa*.
Inflorescence dense; leaves densely softly white-tomentose beneath, ovate, acuminate at apex, the transverse nervules obscure; stipules .2—2.5 in. long with two erect teeth on a broad base, not curved; corolla-tube about 1 in. long, the limb about .5 in. in diam.; berry globose, .4 in. in diam., sparsely hirsute.....4. *frondosa*.

Branchlets and leaves roughly hirsute-pilose; inflorescence close, corolla-tube over 1 in. long, the limb .7—9 in. broad; stipules .3—4 in. long, bifurcated nearly to the base into slender spreading teeth; leaves elliptic-ovate, acuminate, usually more or less rounded at base, strigosely villous; berry globose, .5 in. in diam., sparingly hirsute.....5. *hirsutissima*.

1. MUSSAENDA TOMENTOSA, Wt.; F. B. I. iii. 88: W. & A. 394.
Carnatic, Gingee Hills of S. Arcot, among rocks in shade (Wight); W. Gháts, at Kannikatti, Tinnevely, 2,500 ft. (Barber).
Apparently a straggling shrub with white flowers turning yellowish.
2. MUSSAENDA GLABRATA, Hutch. in Herb. Kew. *M. frondosa* var. *glabrata*, Hook. f. in F. B. I. iii. 90. *M. frondosa* vars. γ , δ , W. & A. 394; W. Ill. t. 124.
W. Gháts, in S. Canara, Malabar and the Tinnevely Hills.
A climbing shrub, nearly glabrous, with orange flowers and very lax inflorescence, the long calyx-lobes conspicuous.
3. MUSSAENDA LAXA, Hutch. in Herb. Kew. *M. frondosa* var. *laxa*, Hook. f. in F. B. I. iii. 89.
W. Coast and W. Gháts, at low levels from S. Canara to Travancore, inland from Mysore to Tinnevely up to 3,000 ft.
A climbing shrub with lax inflorescence.
4. MUSSAENDA FRONDOSA, Linn.; F. B. I. iii. 89, vars. 1 *zeylanica* and 2 *ingrata*, Hook. f. only. *M. frondosa* var. α , W. & A. 393.
S. Carnatic (probably, but no locality given, Wight), type in Ceylon.
A straggling shrub with dense inflorescence and red flowers.
5. MUSSAENDA HIRSUTISSIMA, Hutch. in Herb. Kew. *M. frondosa* var. *hirsutissima*, Hook. f. in F. B. I. iii. 90 in part. *M. frondosa* var. β , W. & A. 394.
W. Gháts from Mysore through Nilgiris and Pulneys to Tinnevely and Travancore at about 4,000—6,000 ft., common in Nilgiris.
A large climbing shrub with conspicuous orange flowers and white calycine leaves. The flowers are frequently distorted by insect agency.

16. *Acranthera*, Arn.

Herbs or low undershrubs. *Leaves* large, membranous; stipules interpetiolar, triangular or ovate. *Flowers* blue, in sessile or stoutly pedunculate subterminal cymes; bracts and bracteoles persistent. *Calyx*-tube oblong; lobes 5. *Corolla*-tube tubular-funnel-shaped, hairy without; lobes 5, valvate. *Stamens* 5, included in the tube; filaments filiform; anthers included, cohering at their apices, usually mucronate, the connective enlarged. *Ovary* 1-celled or apparently 2-celled, the parietal placentas meeting in the centre; ovules many; style filiform; stigma clavate, often verrucose. *Fruit* an oblong or fusiform berry, many-seeded. *Seeds* minute; testa crustaceous, pitted; embryo clavate, in dense albumen.

Leaves obovate, up to 10 in. long by 3 in. broad, obtuse at apex, long-attenuate and almost decurrent on the petiole at base, conspicuously crispate-pubescent on the nerves and nervules beneath; corolla-tube 1·5 in. long, softly white-tomentose, calyx-lobes linear-lanceolate, erect.....1. *grandiflora*.
Leaves oblanceolate, up to 6 in. long by 1·5 in. broad, obtuse at apex, attenuate but not decurrent at base, tawny-pubescent on the nerves and nervules beneath; corolla-tube about ·75 in. long, tawny-villous; calyx-lobes short, obovate, spreading.
 2. *anamallica*.

1. *ACRANTHERA GRANDIFLORA*, Bedd. Ic. t. 25; F. B. I. iii. 93.
 W. Gháts, hills of Tinnevely and Travancore at 3,000—5,000 ft., in moist forests.
 A pretty herbaceous plant with erect stem apparently about 6 in. long, the flowers pale blue.
2. *ACRANTHERA ANAMALLICA*, Bedd. Ic. t. 23; F. B. I. iii. 93.
 W. Gháts, in the Anamalai and Tinnevely Hills at 4,000—5,000 ft., on stream banks in moist forests.
 A low herbaceous plant with very short stem, the flowers deep blue.

17. *Mycetia*, Reinw.

Small shrubs, the stems with spongy bark. *Leaves* membranous, many-nerved; petioles often long; stipules large, interpetiolar. *Flowers* white yellow or greenish, in axillary and subterminal paniced diffuse cymes; bracts often glandular. *Calyx*-tube globose; lobes 4—6, persistent. *Petals* 4—6, connate in a tubular corolla; lobes valvate. *Stamens* 4—6, adnate to the corolla-tube; filaments short; anthers linear-oblong. *Ovary* 2- or 5—6-celled; ovules many, on fleshy peltate placentas; style cylindric; stigmas 2 or 5—6, linear. *Fruit* a globose fleshy or leathery berry, 2- or 5—6-celled, indehiscent or loculicidally dehiscent. *Seeds* very many, minute, angular; testa dotted; embryo minute, in fleshy albumen.

MYCETIA ACUMINATA, O. Kze. Rev. Gen. 289. *Adenosacme Lawii*, Hook. f.; F. B. I. iii. 96. *Lawia acuminata*, Wt. Ic. t. 1070.

W. Gháts, in forest undergrowth, from Coorg (Bourne) through Nilgiris southwards, at about 3,000 ft.

A soft small shrub with large membranous leaves, yellow flowers and white berries.

18. *Urophyllum*, Wall.

Trees or shrubs. *Leaves* petioled, usually oblong-lanceolate and long-acuminate. *Flowers* small, in axillary, sessile or peduncled, heads cymes or corymbs; pedicels short, bracteolate. *Calyx*-tube short; limb cup-shaped, 5-lobed, persistent. *Corolla*-tube short, villous at the throat within; lobes 5, triangular, valvate. *Stamens* 5, on the throat of the corolla; filaments short; anthers oblong, the connective sometimes produced. *Disk* annular. *Ovary* 4—7-, usually 5-celled; ovules numerous, on axile placentas; style short; stigma entire or 4—7-lobed. *Fruit* a small many-seeded berry. *Seeds* minute, subglobose; testa crustaceous, pitted; embryo clavate, in fleshy albumen.

UROPHYLLUM ZEYLANICUM, Thw.: F. B. I. iii. 98. *Axanthes ceylanica*, Wt. Ic. t. 1163.

W. Gháts, Anamalai Hills (Beddome).

A shrub with narrow, elliptic-lanceolate, acuminate leaves and orange-yellow berries.

19. *Chomelia*, Linn.

Trees or shrubs, the young parts often resinous. *Leaves* petioled; stipules interpetiolar, triangular-ovate. *Flowers* white, in terminal corymbose cymes, sessile or pedicelled; bracteoles 2 under the calyx, or if the flowers are pedicelled on the pedicel. *Calyx*-tube ovoid or turbinate; limb short with 5 lobes. *Corolla*-tube funnel-shaped or cylindric, lobes 5, twisted and overlapping to the left in bud, spreading in flower or reflexed. *Stamens* 5, adnate to the mouth of the corolla-tube; filaments short or 0; anthers narrow, linear, the connective produced in an apiculus. *Ovary* 2-celled; ovules many in each cell; style stout, often pubescent; stigma fusiform, grooved, usually far-exserted. *Fruit* a small globose berry; cells 2, many-seeded. *Seeds* plano-convex; testa granular; albumen fleshy or horny; embryo small with leafy cotyledons.

CHOMELIA ASIATICA, O. Kze. *Webera corymbosa*, Willd.; F. B. I. iii. 102. *Stylocoryne Webera*, W. & A. 401; Wt. Ic. tt. 309, 584.

Dry forests in all plains Districts, common.

A large evergreen shrub with shining leaves, turning black (like most other species) in drying. The wood is light brown, hard and close-grained. Vern. *Tel.* Komi; *Tam.* Kura.

Var. *rigida*. *Stylocoryne rigida*, Wt. Ic. t. 1064, has smaller leaves with the nerves impressed above, and short calyx-lobes.

W. Gháts, Shola forests of the Bababudan Hills, Nilgiris, Pulneys and Tinnevely Hills at and over 5,000 ft.

Var. *montana*, Thw., has large leaves with impressed nerves, large flowers and conspicuous persistent calyx-lobes.

Shola forests of the Anamalai and Pulney Hills, above 5,500 ft.

20. *Byrsophyllum*, Hook. f.

Small trees or shrubs with stout branches, glabrous. *Leaves* very coriaceous; stipules large, interpetiolar, deciduous. *Flowers* large,

dioecious, white or rose, ♂ in few-flowered terminal corymbs, ♀ solitary or in pairs, terminal; bracteoles small, linear-lanceolate. *Calyx*-tube in ♀ globose; limb in both ♂ and ♀ truncate. *Corolla* coriaceous, tube long, cylindric, the throat campanulate; lobes 4—6, twisted in bud. *Stamens* as many as the corolla-lobes, in the throat of the corolla; anthers sessile, included. *Ovary* 2-celled; ovules numerous, immersed in fleshy placentas adnate to the septum; style filiform; stigma fusiform, or 2 cohering. *Fruit* an ovoid or globose 2-celled berry. *Seeds* oblong, flattened.

BYRSOPHYLLUM TETRANDRUM, Hook. f.; F. B. I. iii. 107; Bedd. Fl. t. 326. *Gardenia tetrandra*, Bedd. Ic. t. 20.

Travancore and S. Tinnevely mountains at 4,000—5,000 ft. (Beddome, Bourdillon).

A shrub or small tree with very coriaceous shining elliptic-obovate obtuse leaves, the flowers white tinged with rose, the berry about .75 in. in diam., the large stipules conspicuous before their fall.

21. *Randia*, Linn.

Trees or shrubs, armed or unarmed, the spines usually in opposite pairs, axillary to the branchlets. *Leaves* often with one of each pair arrested; stipules interpetiolar, short, free or connate. *Flowers* often dimorphic, white or yellowish, in axillary or leaf-opposed cymes, sometimes fascicled, rarely solitary. *Calyx*-tube ovoid or turbinate, the limb often tubular; lobes 5. *Corolla*-tube long or short, usually with a ring of hairs within; lobes 5, twisted to the left in bud, afterwards spreading. *Stamens* 5; anthers linear. *Disk* annular or pulvinate. *Ovary* 2-, rarely more-celled; ovules numerous, sunk in placentas attached to the septum; style slender; stigma fusiform, entire or bifid. *Fruit* a globose ovoid or ellipsoid berry, 2-celled, many-seeded. *Seeds* often embedded in pulp, smooth or angled; testa usually thin; albumen horny; cotyledons small.

Thorny plants:—

Berry with seeds embedded in pulp:—

Rind of the berry drying hard; the berry 1 in. in diam. or more:—

Spines short, sharp, in 1—2 pairs at the ends of arrested branchlets; leaves large, obovate or oblanceolate, obtuse or sometimes acute when young, up to 8 in. long by 4 in. broad; flowers solitary, dimorphic, in larger flowers up to 2 in. in diam.; fruit ovoid, smooth, up to 3 in. long; seeds smooth.....1. *uliginosa*.

Spines axillary, opposite or alternate; flowers single or in fascicles of 1—3; corolla under 1 in. in diam.:—

Leaves obovate, under 1.5 in. long, .75 in. broad; calyx-lobes about .2 in. long, ovate with occasional intermediate appendages; fruit globose, smooth or slightly ribbed, about .75 in. in diam.; seeds smooth.

2. *dumetorum*.

Leaves usually more than 1.5 in. long:—

Calyx-lobes ovate, often with subulate appendages like the tube, densely hairy, .2 in. long; leaves elliptic or obovate with prominent regular hispidly villous nerves, which have tufts in their axils, up to 3 in. long, 1.5 in. broad; fruit ovoid-globose, ribbed, 1—1.5 in. in diam.; seeds smooth and usually minutely reticulate.....3. *Brandisii*.

Calyx-lobes lanceolate, not appendaged, recurved, sparsely hispid, 1.5—2 in. long; leaves obovate-spathulate with inconspicuous distant

nerves, puberulous or glabrous, up to 5 in. long, 2 in. broad; fruit obovoid-globose, slightly ribbed, 1—1.5 in. in diam.; seeds smooth

4. *longispina*.

Rind of the berry thin, leathery, the berry globose, up to .5 in. in diam.; spines in axillary pairs; flowers in short cymes; calyx-teeth short, triangular, deciduous with the limb; leaves orbicular or obovate, attenuate at base, up to 4 in. long, 3 in. broad, the nerves prominent, glabrous or velvety; seeds smooth

5. *Candolleana*.

Berry small, hard, the few seeds not embedded in pulp; spines in axillary pairs; leaves obovate, 1—3 in. long, coriaceous, glabrous; flowers in umbel-like axillary corymbs with many bracteoles; seeds rough, with ruminate albumen

6. *malabarica*.

Plants without thorns; flowers in leaf-opposed cymes:—

Erect tree; leaves lanceolate, acuminate, up to 6 in. long, 2 in. broad, glabrous; calyx-lobes short; corolla-tube longer than the lobes; berry globose, .3—4 in. in diam.

7. *Gardneri*.

Climbing shrub; leaves elliptic or ovate, shortly and obtusely acuminate, glabrous, up to 7 in. long by 3 in. broad; calyx-lobes very short; corolla-tube much shorter than the lobes; berry ovoid, seeds rather few, very rugose.

8. *rugulosa*.

1. *RANDIA ULIGINOSA*, DC.; F. B. I. iii. 110; W. & A. 398; Wt. Ic. t. 397. *Gardenia uliginosa*, Retz; Roxb. Cor. Pl. t. 135.

All dry Districts in open forests, in wet places, savannah lands and on black cotton soil, in the hills up to 3,000 ft.

A small deciduous tree with fragrant white flowers. Bark reddish-brown; wood greyish-white, hard and close-grained. Vern. *Hind.* Pindalu; *Ur.* Pendra; *Tel.* Nallaika; *Tam.* Wagatta; *Mal.* Karei.

2. *RANDIA DUMETORUM*, Lamk.; F. B. I. iii. 110 in part; W. & A. 397; Wt. Ic. t. 580. *Gardenia dumetorum*, Retz; Roxb. Cor. Pl. t. 136.

East Coast Districts, in dry evergreen forests.

A large shrub with opposite spines, white flowers turning yellow and a yellow fruit, used as a fish poison. Wood hard and close-grained. The branches are used for thornfences. Vern. *Tel.* Manga; *Tam.* Madu karei.

- Var. *floribunda*. *R. floribunda*, DC.; W. & A. 398; Wt. Ic. t. 583.

East Coast, from the Kistna southwards, on coast sands chiefly.

A branching shrub with very small leaves, small fruit and many white flowers, the branches used for fencing.

3. *RANDIA BRANDISII*, Gamble n. comb. *R. tomentosa*, W. & A. 398, not of Blume.

Western Deccan and Carnatic from Mysore and Bellary to South Travancore; W. Gháts, dry slopes of Nilgiris and Pulneys up to 4,000 ft.

A large shrub or small tree with prominently nerved tomentose leaves, very hispidly villous calyx-tube and lobes and ribbed fruit.

4. *RANDIA LONGISPINA*, W. & A. 398; Wt. Ic. t. 582. *R. dumetorum*, Lamk.; F. B. I. iii. 112, in part only.

N. Circars, in the forests of Ganjam and Vizagapatam, up to 4,000 ft.

A small tree with large thin leaves, slender branches, and yellow

apple-like fruit, used as fish poison. The spines are long in open places, small in trees under shade as in the Ganjam Sál forests. Bark grey; wood white or light brown, hard and even-grained. Vern. *Hind* Mainphal; *Ur*. Potowa.

5. *RANDIA CANDOLLEANA*, W. & A. 399; F. B. I. iii. 113.

Deccan, Kambakam Hills of Chingleput, Naggur Hills of N. Arcot, Lambton's Peak in Coimbatore.

A small tree with thin glabrous leaves and crowded sub-terminal corymbs of white flowers.

Var. *corymbosa*. *R. corymbosa*, W. & A. 399. *R. deccanensis*, Bedd.

Ic. t. 237.

Dry Districts of the Deccan in Kistna, Kurnool, Cuddapah and Anantapur, in open forest land.

A small tree with large stout thorns in pairs on poor soils, often unarmed, the leaves thicker, nearly orbicular and densely tawny-velvety. Bark thick, brown; wood light brown, hard and close-grained. Vern. *Tel*. Kondamanga.

6. *RANDIA MALABARICA*, Lamk.; F. B. I. iii. 111. *Gardenia fragrans*, Koen.; Roxb. Cor. Pl. t. 137. *Griffithia fragrans*, W. & A. 400; Wt. Ic. t. 310, except fruit section.

N. Circars, Deccan and Carnatic, extending to S. Travancore and to the E. slopes of the W. Gháts, in dry evergreen scrub forests, common.

An erect thorny shrub with white scented flowers, red berry and orange seeds, largely cut to make hedges. Bark brown; wood greyish-white, hard and close-grained. Vern. *Tel*. Pedalli; *Tam*. Pudan.

7. *RANDIA GARDNERI*, Thw., F. B. I. iii. 112. *Griffithia Gardneri*, Bedd. Ic. t. 38.

W. Gháts, evergreen forests of the Travancore Hills at 500—1,500 ft.

A medium-sized tree with white flowers. Bark greyish-brown; wood yellowish-brown, smooth and close-grained.

8. *RANDIA RUGULOSA*, Thw.; F. B. I. iii. 113. *Griffithia speciosa*, Bedd. Ic. t. 37.

W. Gháts, from S. Canara and Coorg to the Nilgiris, Anamalais, Pulneys and the hills of Tinnevely and Travancore, up to 4,000 ft.

A large climber with pendulous branches and white flowers, the leaf nerves usually impressed above.

Var. *speciosa*, Hook. f. Flowers larger, on longer pedicels; leaves acute at base, the nerves more raised than impressed.

W. Nilgiris, up to 4,500 ft., Anamalai and Pulney Hills and Sivagiri Hills of Tinnevely.

22. *Gardenia*, Linn.

Trees or shrubs, armed or not. *Leaves* sometimes ternate; stipules intrapetiolar, often connate. *Flowers* usually white, changing to yellow, often large, terminal or axillary, solitary fascicled or cymose, sometimes dimorphic and polygamous. *Calyx*-tube ovoid or obconic; limb

tubular, lobed or cleft or spathaceous. *Corolla*-tube long or short; lobes 5, rarely more, overlapping to the left in bud, then spreading, twisted. *Stamens* as many as the corolla-lobes, adnate to the tube; anthers sessile or subsessile, linear. *Ovary* 1-celled; ovules numerous, 2-seriate, on 2—6 parietal placentas; style thick; stigma club-shaped or fusiform, usually 2-fid. *Fruit* an often large, ovoid ellipsoid or globose, coriaceous or fleshy berry with a hard endocarp polished within, sometimes splitting along the placental sutures. *Seeds* very many, compressed; testa thin; albumen horny; cotyledons ovate or cordate.

Without spines:—

Fruit not or not prominently ribbed; leaves obtuse or subacute, shining, the buds with a bright yellow resin:—

Calyx-teeth short, ovate or lanceolate, acute; leaves under 4 in. long, obovate, sessile, nerves under 20 pairs, the transverse nervules irregular; fruit ellipsoid or oblong with 3—5 placentas; seed 1 in. long, the testa rugose, radicle short.

1. *gummifera*.

Calyx-teeth long, lanceolate, acuminate; leaf-nervules parallel; radicle long:—
Leaves elliptic, shortly petioled, 3—6 in. long, 2—3 in. broad; nerves 20—30 pairs; fruit ellipsoid or subglobose with 2 placentas; seed 2 in. long, the testa rugose.....2. *lucida*.

Leaves broadly elliptic or orbicular, attenuate at base to a short petiole, 6—12 in. long, 3—9 in. broad, nerves 12—18 pairs; fruit globose with 4—5 placentas; seeds nearly 2 in. long, the testa rugose.....3. *latifolia*.

Fruit ribbed; leaves acute, obovate, 2—4 in. long, about 10-nerved; corolla usually double4. *jasmínoides*.

Spines in pairs, strong, sometimes leaf-bearing; flowers dimorphic, the ♂ in fascicles, the ♀ solitary, the calyx-lobes minute in the former, longer in the latter; leaves obovate, glabrous or pubescent beneath, variable in size, nerves few, irregular; fruit large, woody, ovoid or globose, with 5—6 placentas, seeds small, testa smooth5. *turgida*.

1. *GARDENIA GUMMIFERA*, Linn. f.; F. B. I. iii. 116; W. & A. 395; Wt. Ic. t. 576.

N. Circars, Deccan and Carnatic, in deciduous forests, in dry hot localities, westwards to the foot of the Gháts, on the Malabar Coast only in dry laterite forest.

A small tree or shrub with rough twisted branches, and a yellow resin which is used in medicine. Bark greyish-brown; wood yellowish-white, hard and close-grained. Vern. *Hind.* Dikemáli; *Ur.* Gurudu; *Tel.* Manchi bikki; *Kan.* Chitta bikke.

2. *GARDENIA LUCIDA*, Roxb.; F. B. I. iii. 115; W. & A. 395; Wt. Ic. t. 575.

Deccan and Carnatic, in deciduous forests in all the dry Districts.

A small tree or large shrub with pretty shining parallel-nerved leaves and a yellow resin used in medicine. Bark greenish-grey, flaking off; wood yellowish-white, hard and close-grained, useful for small turned articles. Vern. *Hind.* Dikemáli; *Tel.* Yerri bikki; *Tam.* Kumbi.

3. *GARDENIA LATIFOLIA*, Ait.; F. B. I. iii. 116; Roxb. Cor. Pl. t. 134; W. & A. 395; Wt. Ic. t. 759. *G. enneandra*, Koen.; F. B. I. iii. 119; W. & A. 395; Wt. Ic. t. 574.

N. Circars and Deccan, extending to the lower hills of the Gháts, in dry deciduous forests.

Tricalysia.]

A small deciduous tree with large leaves and flowers and a yellow resin. The form with 9 petals and stamens is common in the N. Circars. Bark greenish-grey, exfoliating and leaving rounded depressions; wood light yellowish-brown, close-grained, useful for turning, perhaps for engraving. Vern. *Hind.* Papra; *Ur.* Kota ranga, Jantia; *Tel.* Pedda bikki; *Tam.* Kumbay.

4. *GARDENIA TURGIDA*, Roxb.; F. B. I. iii. 118; Wt. Ic. t. 579. *G. montana*, Roxb.; W. & A. 396.

All dry deciduous forests, especially on rocky hills and on laterite and kunkur.

A small deciduous tree with very strong spines, variable leaves and a large woody fruit. Bark smooth, bluish-grey, thick; wood white, hard and close-grained. Vern. *Hind.* Thanella; *Ur.* Bamenia; *Tel.* Yerra bikki.

Gardenia jasminoides, Ellis, is the Cape Jasmine frequently cultivated in gardens, and usually having double white, very fragrant flowers.

23. *Tricalysia*, A. Rich.

Evergreen trees or shrubs, branchlets tetragonous or terete. *Leaves* petioled; stipules interpetiolar, triangular, acuminate, connate at base. *Flowers* small or very small, polygamo-dioecious, in axillary fascicles or short cymes; bracts and bracteoles connate. *Calyx*-tube short, obconic or hemispheric; limb truncate, 4—5-lobed. *Corolla*-tube short; lobes 4—5, twisted to the left in bud, various in size. *Stamens* as many as the corolla lobes; filaments long or short or even 0; anthers oblong or linear, often curved. *Ovary* 2-, rarely 3-celled; ovules 2—5 in each cell, on fleshy placentas attached to the septum; style short or long; stigmatic arms linear or oblong. *Fruit* a globose or ovoid berry, the pericarp thick, cells 2. *Seeds* few in each cell, compressed vertically; albumen thin, fleshy; cotyledons ovate, radicle long.

Flowers minute, fascicled; calyx-lobes oblong-orbicular; corolla-lobes orbicular; stamens sessile; berry globose, up to .6 in. in diam., the seeds flat, smooth, much compressed, with membranous partitions between; leaves elliptic or lanceolate, obtusely acute, smooth, the main nerves about 6—8 pairs, not prominent, nor the reticulation.....1. *sphaerocarpa*. Flowers in small cymes, the ♂ and ♀ about .4 in. in diam., the ♀ smaller; calyx minutely toothed; corolla-lobes oblong; stamens in ♂ and ♀ with long filaments, exserted; berry ovoid or globose, up to .7 in. in diam., the seeds irregularly compressed, rugose; leaves elliptic-lanceolate, acuminate, the main nerves about 5 pairs, prominent, as is the reticulation.....2. *apiocarpa*.

1. *TRICALYSIA SPHAEROCARPA*, Gamble n. Comb. *Diplospora sphaerocarpa*, Hook. f.; F. B. I. iii. 123.

W. Gháts; Courtallum in Tinnevely (Wight).

A small tree, with smooth leaves and very small flowers.

2. *TRICALYSIA APIOCARPA*, Gamble n. comb. *Diplospora apiocarpa*, Hook. f.; F. B. I. iii. 123; Bedd. Fl. t. 223; *Discospermum apiocarpum*, Dalz.; Bedd. Ic. t. 40.

W. Gháts, in the Coimbatore Hills, Nilgiris, Anamalais and hills of Travancore at 3,000—4,000 ft.

A small tree with prominently reticulate leaves, and cream-coloured scented flowers.

24. *Scyphiphora*, Gaertn.

A small glabrous tree, branchlets stout, swollen at the nodes. *Leaves* coriaceous, obovate, obtuse; stipules interpetiolar, short. *Flowers* small, in dense axillary shortly pedunculate cymes. *Calyx*-tube elongate; limb cupular, truncate, 4-5-toothed. *Corolla*-tube cylindric; lobes 4-5, oblong, spreading or recurved, twisted in bud. *Stamens* 4-5, between the corolla-lobes; anthers linear-sagittate. *Disk* annular. *Ovary* 2-celled; ovules 2 in each cell, on the middle of the septum; style filiform with linear branches. *Fruit* a subcylindric 8-10-grooved drupe with 2 crustaceous connate pyrenes. *Seeds* subcylindric; testa membranous; albumen scanty; cotyledons oblong.

SCYPHIPHORA HYDROPHYLLACEA, Gaertn.; F. B. I. iii. 125. *Epithynia malayana*, Jack; W. & A. 424.

E. Coast, in mangrove forests (Wight).

A small evergreen tree resembling *Lumnitzera* and often found with it, but very scarce, and apparently only once collected.

25. *Knoxia*, Linn.

Erect herbs or undershrubs; stems terete or obscurely angled. *Leaves* opposite; stipules connate with the petiole in a sheath. *Flowers* dimorphic, from white to pink, lilac and even purple; subsessile on the elongating branches of terminal cymes; ebracteolate. *Calyx*-tube ovoid; teeth 4, minute and subequal or 1 or 2 elongate, persistent. *Corolla*-tube long, the throat usually villous; lobes 4, valvate with inflexed tips. *Stamens* 4, inserted within the throat of the corolla; anthers linear, included or exserted. *Ovary* 2-celled; ovule 1 in each cell, pendulous; style filiform; stigma 2-lobed, included or exserted. *Fruit* small, of 2 semi-terete indehiscent mericarps separating from an entire or bifid persistent columella. *Seeds* with membranous testa; albumen fleshy; cotyledons very small; radicle superior.

Calyx-lobes equal or nearly so, one slightly longer, flowers in corymbose cymes:—

Stipules with short blade furnished with 3-5 or more long subulate bristles:—

Stipule-bristles hirsute; ripe fruit separating vertically from the columella, the mericarps remaining connate:—

Leaves lanceolate or linear-lanceolate, up to 6 in. long, 1 in. broad, grey pubescent; cymes lax with elongating slender branches.....1. *corymbosa*.

Leaves ovate, acuminate, up to 5 in. long, 1.5 in. broad, densely and usually rufous pubescent but sometimes almost white; cymes dense with short subumbellate branches.....2. *mollis*.

Stipule-bristles glabrous, often very long and conspicuous; ripe fruit separating from the base into two mericarps away from the columella; leaves lanceolate, long acuminate, up to 5 in. long, 1.5 in. broad, nearly glabrous...3. *Heyneana*.

Stipules with rounded blade and few short glabrous teeth; mericarps separating from the base; leaves oblong-lanceolate or linear-lanceolate, often folded, curved downwards, glabrous; cymes small with slightly elongating branches; fruit subglobular.....4. *Wightiana*.

Stipules ovate, long-acuminate, pectinate, hirsute; mericarps not separating from each other; leaves linear or linear-lanceolate, scabrous-pubescent, up to 2.5 in. long, .1-3 in. broad; cymes erect with slender racemose branches; fruit ovoid

5. *linearis*.

One calyx-lobe much enlarged; flowers in long slender spikes; leaves ovate or ovate-oblong, up to 2 in. long; stipules with 3-5 filiform bristles; mericarps separating.....6. *zeylanica*.

1. *KNOXIA CORYMBOSA*, Willd.; F. B. I. iii. 128; W. & A. 439; Wt. Ill. t. 128.
All Forest Districts, chiefly on grass lands in woodland and up to about 6,000 ft. in the hills.
An erect herb with pale lilac flowers, long narrow leaves and long stem-internodes, the whole plant very grey.
2. *KNOXIA MOLLIS*, W. & A. 439; F. B. I. iii. 129.
W. Gháts, in all Districts, especially the Nilgiris and Pulneys, above 5,000 ft., common.
A straggling herb, sometimes woody at base, the flowers varying from white to purple, unpleasantly scented, the leaves variable in pubescence. Fyson is correct in distinguishing two forms, a smaller roadside one and a larger one in damp sholas.
3. *KNOXIA HEYNEANA*, DC.; F. B. I. iii. 129; W. & A. 440.
W. Gháts, in the hills of Tinnevely and Travancore, about 4,000—5,000 ft.
An erect herb nearly quite glabrous, from a woody rootstock.
4. *KNOXIA WIGHTIANA*, Wall.; F. B. I. iii. 129; W. & A. 440.
Deccan, hills of Cuddapah, N. Arcot and Chingleput; W. Gháts, from the Nilgiris southwards, up to about 5,000 ft.
An erect herb, woody at base, the flowers pale blue, the leaves very narrow.
5. *KNOXIA LINEARIS*, Gamble in Kew Bull., 1920, 68.
W. Gháts, Mahendragiri Hill, Tinnevely (K. Rangachari).
An erect, slender, graceful, herbaceous perennial, with many stems from a woody rootstock.
6. *KNOXIA ZEYLANICA*, Linn.; F. B. I. iii. 130; W. & A. 440.
Wynaad (Beddome).
An erect undershrub with white or pinkish flowers in long slender spikes, the corolla-tube very long and slender.

26. *Plectronia*, Linn.

Trees or shrubs, erect or climbing, armed or unarmed. *Leaves* petioled; stipules connate. *Flowers* in axillary fascicles or peduncled corymbose cymes, white or greenish, small. *Calyx*-tube short, obconic or turbinate; limb short, truncate or 4—5-lobed. *Corolla*-tube funnel-shaped campanulate or cylindric, usually with a ring of deflexed hairs within; lobes 4—5, valvate in bud, at length reflexed. *Stamens* 4—5, on the throat or mouth of the corolla; filaments short or 0. *Disk* rounded, cushion-like. *Ovary* 2-celled; ovules solitary in each cell, pendulous; style stout, sometimes with a tuft of hairs; stigma large. *Fruit* a didymous or subglobose drupe, one carpel sometimes suppressed; pyrenes 2, each 1-celled. *Seeds* oblong, pendulous; testa membranous; albumen fleshy, cotyledons short with an elongated superior radicle.

Unarmed:—

Flowers pentamerous:—

Flowers in axillary peduncled cymes or umbels, corolla-tube narrow; leaves

shining on the upper surface; stipules ovate with a dorsal subulate hard point:—

Leaves coriaceous; pyrenes prominently rugose, the pericarp thin:—

Fruit small, .25—5 in. long, globose or obcordate, compressed; leaves ovate or ovate-lanceolate or narrowly oblong-lanceolate, acuminate

1. *didyma*.

Fruit large, up to 1 in. or more long, pyriform, compressed; leaves elliptic, shortly acuminate..... 2. *ficiformis*.

Leaves chartaceous, elliptic, caudate-acuminate; pyrenes rugose, the pericarp thick; fruit globose, .75—1 in. in diam..... 3. *pergracilis*.

Flowers in axillary umbels, the peduncle very short or 0, the corolla-tube broad; leaves dull, coriaceous or chartaceous, elliptic-obtuse or acute; stipules ovate-lanceolate; fruit obovoid, obcordate, compressed, .25—5 in. long, pyrenes smooth..... 4. *neilgherrensis*.

Flowers tetramerous, in fascicles of cymes axillary with the leaves on stout arrested branchlets, pedicels very slender; leaves membranous, ovate, acuminate, pale beneath, up to 2 in. long; stipule points filiform; fruit flattened, orbicular, .4 in. in diam., pyrenes rugose..... 5. *travancorica*.

Armed, the spines supra-axillary:—

Flowers pentamerous, in short few-flowered axillary fascicles or cymes, the corolla-tube short, broad, slightly constricted above, furnished with a curtain of stiff reflexed hairs within, lobes lanceolate; leaves from ovate-cordate to lanceolate-acuminate; fruit obcordate, compressed, about .4 in. in diam.; pyrenes rugose

6. *Rheedii*.

Flowers tetramerous, in many-flowered axillary cymes, very small, the corolla-tube short with short reflexed hairs within, lobes ovate; leaves variable, ovate obovate or orbicular, up to 2 in. long, 1.5 in. broad but often much smaller; fruit obcordate, .5 in. in diam.; pyrenes furrowed..... 7. *parviflora*.

1. PLECTRONIA DIDYMA, KURZ. *Canthium didymum*, Gaertn.; F. B. I. iii. 132; W. & A. 425.

All plains Districts in dry evergreen and open forests in the low country on both sides of the Peninsula, often on river banks. A small evergreen tree, the leaves variable in size and shape but always shining, flowers in cymes, fruit usually globose. Bark dark grey, smooth; wood light brown, hard and close-grained. Vern. *Ur*. Dhalasingha; *Tel*. Nalla halasu; *Tam*. Irambarathán.

Var. *umbellata*, Gamble. *P. Wightii*, K. Schum. *Canthium umbellatum*, Wt. Ic. t. 1034; F. B. I. iii. 132. *C. didymum*, Bedd. Fl. t. 221.

Most Districts, in forest country in hilly regions up to 6,000 ft. A larger evergreen tree with larger and thicker, broader leaves, flowers in umbels on thick peduncles, fruit larger and obovoid. Wood pale yellow, strong and tough (Bourdillon). Vern. *Tam*. Nallamanthanam; *Mar*. Arsul.

Var. *lanceolata*, Thw. *Canthium lanceolatum*, Arn.

Hills of Tinnevely (Wight, Barber).

Leaves narrowly oblong-lanceolate acuminate, up to 5 in. long, 1.25 in. broad; flowers in fewer-flowered umbels, perhaps a distinct species.

2. PLECTRONIA FICIFORMIS, Gamble n. comb. *Canthium ficiforme*, Hook. f.; F. B. I. iii. 133.

W. Gháts, Pulney Hills (Bourne) and Sivagiri Hills of Tinnevely (Wight) at fairly high elevations.

An evergreen tree, like the preceding, but with elliptic leaves, umbels often compound and very large fruit.

3. PLECTRONIA PERGRACILIS, Gamble, n. comb. *Canthium pergracile*, Bourd. in Journ. Bomb. Nat. Hist. Soc. xii. 352, t. 4.
Evergreen forests of Travancore near Colatoorpolay at about 500 ft. (Bourdillon).
A graceful, tall, straight-stemmed tree with greenish-yellow flowers. Bark light brown, rough; wood pale brown, moderately hard. Vern. *Mal.* Palaga.
4. PLECTRONIA NEILGHERRENSIS, Bedd. *Canthium neilgherrense*, Wt. Ic. t. 1064 bis; F. B. I. iii. 133, var. 1; Bedd. Fl. t. 221A (fruit).
W. Ghâts, Sholas of W. Nilgiris about Sispara; forests of the Travancore and Tinnevely Hills at 4,000—6,000 ft.
An evergreen shrub or small tree with coriaceous glabrous leaves, obtusely acute or obtuse at apex, the margins often recurved.
Var. *chartacea*, Gamble. *Canthium neilgherrense*, Wt.; F. B. I. iii. 133, var. 2.
W. Ghâts, Coonoor and Longwood Sholas of E. Nilgiris; Sholas of the Pulney Hills at 5,000—7,000 ft.
A small tree with chartaceous acute leaves, hirsute beneath.
5. PLECTRONIA TRAVANCORICA, Bedd. Ic. t. 239. *Canthium travancoricum*, Hook. f. in F. B. I. iii. 134.
W. Ghâts, in the Anamalais and hills of Travancore and Tinnevely.
A medium-sized tree with thin, long-petioled leaves and white flowers.
6. PLECTRONIA RHEEDI, Bedd. *Canthium Rheedi*, DC.; F. B. I. iii. 134; W. & A. 426.
W. Coast and W. Ghâts from S. Canara southwards up to about 4,000 ft.
A scandent thorny straggling shrub with greenish-white flowers, the branchlets and leaves beneath usually hirsute.
Var. *angustifolia*, Gamble. *Canthium angustifolium*, Roxb.; F. B. I. iii. 135. *C. Leschenaultii*, W. & A. 426; Wt. Ic. t. 826.
W. Coast and W. Ghâts, especially in the south, up to 5,000 ft. Leaves lanceolate, long-acuminate, glabrous and shining, occasionally very narrow.
7. PLECTRONIA PARVIFLORA, Bedd. *Canthium parviflorum*, Lamk.; F. B. I. iii. 136; Roxb. Cor. Pl. t. 51; W. & A. 426.
All dry plains Districts, in scrub forest, especially on laterite and near the coast, very common.
A thorny shrub with small white flowers, the leaves variable, small and with many thorns in very dry places, larger in moister ones. Bark grey, wood grey, hard. The stems and branches are largely used for dry fences. Vern. *Tel.* Balasu; *Mar.* Kirna; *Tam.* Karay cheddi.

27. Vangueria, Juss.

Erect shrubs or small trees, armed or unarmed. *Leaves* petioled; stipules connate. *Flowers* small, white or greenish, in axillary fascicles or peduncled cymes or in lateral panicles below the leaves. *Calyx*-tube

short, turbinate or globose; limb spreading; lobes 4—6, sometimes more. *Corolla*-tube cylindric or globose, with a ring of silky deflexed hairs within; lobes 4—6, lanceolate, acute, at length reflexed. *Stamens* as many as the corolla-lobes, filaments short or 0; anthers oblong. *Ovary* 3—6 but usually 5-celled; ovules solitary in each cell, pendulous; style thick; stigma large, capitate, ridged. *Fruit* a dry or fleshy drupe, with 3—5 pyrenes, the apex areolate. *Seeds* in each pyrene solitary; testa membranous; albumen fleshy; cotyledons small with an elongated superior radicle.

VANGUERIA SPINOSA, Roxb.; F. B. I. iii. 136; W. & A. 421 (in note).

Most plains Districts, but occasional and scarce.

A small thorny tree or large shrub, the fruit small.

V. edulis, Vahl, a native of Madagascar, with rather large edible fruit, larger leaves and flowers in panicles of racemes, is sometimes found in gardens in Madras and elsewhere.

28. Octotropis, Bedd.

Glabrous shrubs or small trees, branches slender. *Leaves* shortly petioled, elliptic-lanceolate, caudate-acuminate, membranous; stipules interpetiolar, triangular-ovate, acuminate. *Flowers* in axillary or supra-axillary pedunculate corymbs, pedicels slender; bracts and bracteoles minute. *Calyx*-tube short, turbinate; limb 4-toothed. *Corolla*-tube campanulate, villous within; lobes 4, ovate, overlapping to left. *Stamens* 4, linear, apiculate, sagittate at base, sessile. *Ovary* 1-celled; ovules 1 or 2, pendulous; style stout, ribbed; stigma bifid. *Fruit* an ellipsoid berry with fleshy pericarp. *Seed* ovoid, pendulous; testa membranous; albumen horny; cotyledons small, foliaceous.

OCTOTROPIS TRAVANCORICA, Bedd. Fl. t. 327; F. B. I. iii. 131.

W. Ghâts, from the Wynaad to the hills of Travancore and Tinnevely, at 3,000—5,000 ft., in moist evergreen forest.

A pretty shrub or small tree reaching 10-15 ft. in height, with white flowers and a single-seeded berry.

29. Izora, Linn.

Shrubs or small trees. *Leaves* opposite, rarely ternate, usually thick; stipules interpetiolar. *Flowers* usually 4- (rarely 5-) merous, in terminal, trichotomously branched, often corymbose cymes; bracts usually leaf-like, coriaceous; bracteoles 2. *Calyx*-tube ovoid; limb short, 4-, rarely 5-lobed, the lobes persistent. *Corolla* hypocrateriform; tube long, slender; lobes 4 (rarely 5), twisted in bud, spreading or reflexed in flower. *Stamens* 4 (rarely 5) on the mouth of the corolla; filaments short or 0; anthers slender, 2-fid at base, mucronate at tip. *Ovary* 2-celled, ovules solitary in each cell, peltately attached to the septum; style filiform; stigma fusiform, slender, 2-branched, the branches rarely connate. *Fruit* globose or didymous with 2 plano-convex or ventrally concave coriaceous pyrenes. *Seeds* peltate, often 1 only, the others undeveloped, testa membranous; albumen horny; embryo curved, the cotyledons thin, the radicle stout and long, inferior.

Calyx-lobes manifestly longer than the tube:—

Calyx-lobes broad, oblong-lanceolate, .15—.25 in. long; corymbs dense and compact:—

Branches of the inflorescence densely clothed with white hairs; corymbs about 5 in. broad, subsessile; bracteoles oblong-lanceolate, about .2 in. long; corolla-tube slender, 1 in. long; leaves large, elliptic obovate or oblanceolate, up to 12 in. long, 5 in. broad, abruptly acuminate, the nerves distant...1. *polyantha*. Branches of the inflorescence glabrous; corymbs about 3 in. broad, short-peduncled; bracteoles linear; corolla-tube .75—1 in. long; leaves obovate or oblanceolate, up to 4 in. long, 1.5 in. broad, obtuse.....2. *Finlaysoniana*.

Calyx-lobes lanceolate or linear-lanceolate, .075—.15 in. long, the margins usually incurved:—

Calyx-lobes glabrous:—

Corymbs lax:—

Leaves lanceolate, broadest near the nearly obtuse base, up to 6 in. long, .75—1.25 in. broad, the nerves stout, nearly at right angles to the midrib, prominently looped; corolla-tube up to .75 in. long, lobes .35 in. long; bracteoles linear, like the calyx-lobes.....3. *lanceolaria*.

Leaves elliptic-ovate or oblong, broadest at the middle, acute or acuminate, up to 5 in. long, 2 in. broad, the nerves slender at about 60° with the midrib, looped; corolla-tube up to .6 in. long, the lobes scarcely shorter; bracteoles subulate, narrower than the calyx-lobes.....4. *leucantha*.

Corymbs dense:—

Leaves coriaceous, elliptic-obovate, obtusely acute at apex, attenuate or rounded at base, shining above, the midrib and nerves strong, up to 8 in. long, 3 in. broad; corymbs long-peduncled, brachiate; corolla-tube .3—5 in. long, the lobes recurved in flower.....5. *Notoniana*.

Leaves submembranous, elliptic-obovate, acute and mucronate at apex, broadly attenuate at base, dull above, the nerves thin, impressed above, up to 8 in. long, 3.5 in. broad; corymbs sessile, dense; corolla-tube .75 in. long, the lobes reflexed in flower.....6. *Johnsoni*.

Calyx-lobes hirsute; corymbs rather lax with short peduncles; leaves coriaceous-elliptic or elliptic ovate, scabrous pubescent beneath, up to 6 in. long by 2.5 in. broad, the nerves prominent; corolla-tube .5 in. long, the lobes reflexed in flower; bracteoles filiform.....7. *Saulierei*.

Calyx-lobes linear, .15 in. long, ciliate, as are the linear bracteoles; corymbs shortly peduncled, densely congested; corolla-tube .3—5 in. long; leaves coriaceous, variable, from elliptic-ovate to oblong-lanceolate, usually rounded at base, somewhat shining above, up to 6 in. long by 2.5 in. broad.....8. *Lawsoni*.

Calyx-lobes about equal to the tube:—

Calyx-tube and lobes pubescent:—

Peduncles 4—7 in. long, the cymes brachiate, the corymbs densely congested; corolla-tube .5 in. long, lobes reflexed, covered with spreading hairs; leaves large, chartaceous, elliptic-obovate or oblanceolate with regular parallel nerves.....9. *elongata*.

Peduncles short or 0:—

Peduncles about .5 in. long, the branches long and slender and again divided to end in spreading corymbs; corolla-tube .5—1 in. long, lobes glabrous; leaves large, lanceolate or oblanceolate, acuminate, up to 6 in. long, 2.5 in. broad.....10. *cuneifolia*.

Peduncles 0, the 3 branches slender, .5 in. long, ending in small dense corymbs; corolla-tube about .35 in. long, the lobes reflexed puberulous; leaves small, oblanceolate, acuminate, up to 3 in. long, 1 in. broad, pubescent beneath.....11. *monticola*.

Calyx-tube and lobes glabrous; leaves undulate on the margins:—

Corolla-tube 1—1.5 in. long, the cymes sessile, dense; leaves oblong-oblanceolate, shortly acuminate, mucronate, up to 5 in. long, 1.25 in. broad, the nerves sub-horizontal.....12. *Thwaitesii*.

Corolla-tube .25—.35 in. long, the cymes peduncled, brachiate, lax; leaves elliptic or elliptic-lanceolate, acuminate, up to 6 in. or even more long, 2 in. broad.....13. *undulata*.

Calyx-lobes minute, manifestly much shorter than the tube:—

Calyx-lobes triangular, acute, glabrous:—

Leaves and inflorescence black when dry; flowers white, in sessile or peduncled brachiate cymes; corolla-tube .5 in. long, very slender; leaves membranous, lanceolate or elliptic-oblong or obovate, acuminate, narrowed at base, up to 6 in. long, 2.5 in. broad.....14. *nigricans*.

Leaves olive-green when dry; flowers scarlet, in dense sessile or shortly peduncled corymbiform cymes; corolla-tube 1—1.5 in. long; leaves oblong or elliptic, obtuse or shortly acute at apex, rounded or cordate at base, up to 4 in. long by 2.5 in. broad.....15. *coccinea*.

Calyx-lobes reduced to mere teeth, sometimes almost 0:—

Flower-buds globose; cymes sessile or shortly peduncled, much brachiate; corolla-tube under .25 in. long, lobes recurved, under .1 in. long; leaves thinly coriaceous, elliptic-oblong or lanceolate, narrowed at base, obtuse at apex, up to 8 in. long, 3 in. broad.....16. *brachiata*.

Flower-buds ellipsoid; cymes sessile, brachiate, with 3—5 pairs short branches; corolla-tube .3—4 in. long, lobes recurved, .1 in. long; leaves thickly coriaceous, elliptic or obovate, obtuse, rounded or cordate at base, up to 5 in. long, 2.25 in. broad.....17. *parviflora*.

1. *IXORA POLYANTHA*, Wt. Ic. t. 1066; F. B. I. iii. 140. *I. corymbosa*, Heyne; W. & A. 430.

W. Coast, in S. Canara, Malabar and Travancore.

A large and handsome shrub with (apparently) white flowers and a yellowish-red fruit about .4 in. in diam.

2. *IXORA FINLAYSONIANA*, Wall. ex G. Don Gen. Syst. iii. 572.

Mysore, at Bangalore (Cameron), said to be wild, but this is doubtful; gardens in Madras and elsewhere in the East, native country doubtful.

A shrub with white flowers and large membranous calyx-lobes.

3. *IXORA LANCEOLARIA*, Colebr.; F. B. I. iii. 198; W. & A. 429, var. α ; Wt. Ic. t. 827.

Hills of Tinnevely and Travancore, in evergreen forests.

An erect shrub with narrow leaves, the white flowers in lax corymbs.

4. *IXORA LEUCANTHA*, Heyne. *I. lanceolaria*, Hook. f.; F. B. I. iii. 138 in part; W. & A. var. β .

Hills of Tinnevely and Travancore.

A pretty shrub with white flowers in lax, rather few-flowered corymbs.

Var. *malabarica*, Gamble. Leaves longer, more oblong, long-acuminate, corymbs often brachiate.

West Coast, South Canara to Travancore.

5. *IXORA NOTONIANA*, Wall.; F. B. I. iii. 139; W. & A. 1311.

W. Ghâts, in the hills of Mysore, Nilgiris, Anamalais, Pulneys and hills of Travancore, in Shola forests at 3,000—6,000 ft.

A small tree with red flowers. Bark brown, rough; wood reddish-brown, hard and close-grained. Vern. *Tam.* Kalilambili; *Mal.* Iramburippi.

6. *IXORA JOHNSONI*, Hook. f.; F. B. I. iii. 139.

W. Coast, Cochin (Johnson), Travancore (Calder and Ramaswami).

A small tree or large shrub, apparently scarce.

7. *IXORA SAULIEREI*, Gamble in Kew Bull. 1920, 247.
W. Gháts, in the Pulney Hills.
Apparently a small tree with thick leaves, scabrous-pubescent beneath.
8. *IXORA LAWSONI*, Gamble in Kew Bull. 1920, 247.
Wynaad, at Manantoddy, 3,000 ft. (Lawson); Coorg (Wight).
A small tree with very congested villous inflorescence and linear calyx-lobes.
9. *IXORA ELONGATA*, Heyne; F. B. I. iii. 141; W. & A. 430.
W. Gháts, from S. Canara to the Wynaad and Atapadi Hills of Malabar, at about 2,000 ft.
A shrub with pink flowers and long-peduncled inflorescence, the fruits large, black when dry.
10. *IXORA CUNEIFOLIA*, Roxb.; F. B. I. iii. 144; W. & A. 428; Wt. Ic. t. 709.
W. Gháts, in Wynaad and the Atamalai and Anamalai Hills of Coimhatore, about 3,000 ft.
A shrub with pubescent calyx and white or pink (?) flowers.
11. *IXORA MONTICOLA*, Gamble in Kew Bull. 1920, 247.
W. Gháts, "High Wavy Mountain," in Madura District, at 4,000—5,500 ft. (Blatter and Hallberg).
A shrub with pinkish flowers, remarkable for its small leaves and inflorescence.
12. *IXORA THWAITESII*, Hook. f.; F. B. I. iii. 138.
Forests of Malabar (Beddome).
A narrow-leaved shrub, the corolla-tube very long and slender.
13. *IXORA UNDULATA*, Roxb.; F. B. I. iii. 147; W. & A. 428; Wt. Ic. t. 708.
E. Gháts, Madgol Hills of Vizagapatam, at 3,400 ft. (A. W. Lushington); Simhacbellam Hill (Cleghorn).
A shrub with thin undulate leaves and rather small white flowers.
14. *IXORA NIGRICANS*, Br.; F. B. I. iii. 148; W. & A. 428; Wt. Ic. t. 318.
W. Gháts, in evergreen forests, up to about 5,000 ft., common.
A large shrub or small tree with white flowers.
15. *IXORA COCCINEA*, Linn.; F. B. I. iii. 145; W. & A. 427; Wt. Ic. t. 153. *I. Bandhuca*, Roxb.; Wt. Ic. t. 149.
W. Coast, in forest lands at low elevations near the sea; cultivated in gardens everywhere.
A large shrub with brilliant scarlet flowers, sometimes yellow or pink. Vern. *Tam.* Thetti, Vedchi.
16. *IXORA BRACHIATA*, Roxb.; F. B. I. iii. 142; W. & A. 429; Wt. Ic. t. 710.
W. Gháts, from S. Canara to Travancore, at low elevations.
A small tree with white, scented flowers.
17. *IXORA PARVIFLORA*, Vahl; F. B. I. iii. 142; W. & A. 429; Wt. Ic. t. 711; Bedd. Fl. t. 222.
Deciduous forests and dry evergreen forest in almost all Districts, under 1,000—2,000 ft. The Torch Tree.
A small evergreen tree or large shrub with white flowers. Bark

dark brown; wood light reddish-brown, smooth, close-grained. The green branches are said to be used for torches. Vern. *Hind.* Kota gandhal; *Ur.* Kilakerwa; *Tel.* Kori, Gorivi; *Tam.* Shulundu, Korivi; *Kan.* Korgi; *Mar.* Lokandi.

30. Pavetta, Linn.

Shrubs or small trees. *Leaves* opposite, petioled, usually thin; stipules intrapetiolar, usually connate in a loose deciduous sheath. *Flowers* in terminal or axillary trichotomously-branched corymbose cymes; bracteoles small. *Calyx*-limb turbinate or campanulate; lobes 4 (rarely 5). *Corolla* hypocrateriform; tube slender, cylindric; lobes 4 (rarely 5), twisted in bud, spreading in flower. *Stamens* 4 (rarely 5), on the mouth of the corolla; filaments short or long, or 0; anthers linear. *Ovary* 2-celled; ovules solitary in each cell, attached to the septum on a fleshy placenta; style long, much exerted, slender; stigma fusiform, usually undivided. *Fruit* a small fleshy berry with 2 ventrally concave pyrenes. *Seeds* conform to the pyrenes; testa membranous; albumen horny; embryo small, curved, with small foliaceous cotyledons; radicle inferior.

Calyx-teeth minute; branchlets pale brown, thick, subquadrangular; leaves glabrous or tomentose, membranous, very variable in shape but usually elliptic or obovate or oblanceolate; corolla-tube .5—1 in. long.....1. *indica*.

Calyx-teeth short:—

Calyx-teeth triangular; branchlets pale, slender; corolla-tube .5—1 in. long, the lobes rounded at apex; styles very long with minute stigmas; corymbs lax:—

Black when dry; leaves lanceolate or oblanceolate, pubescent beneath, the nerves obscure; inflorescence, including calyx, grey-villous.....2. *hispidula*.

Greenish when dry; leaves oblong or oblanceolate, glabrous beneath, the nerves regular, prominent and prominently arched; inflorescence glabrous or slightly puberulous.....3. *zeylanica*.

Calyx-teeth subulate, recurved; branchlets very pale, stout; corolla-tube short, about .25 in. long, the lobes acute at apex; style short with fusiform stigma; leaves black when dry, elliptic-oblong or -oblanceolate, about 2.5 in. long; corymbs dense.....4. *breviflora*.

Calyx-teeth rather long:—

Calyx-teeth lanceolate, white- or brown-hispid, recurved; corolla-tube .25—1 in. long, the lobes oblong; leaves obovate or oblanceolate, softly hirsute; corymbs dense, the pedicels short.....5. *Brunonis*.

Calyx-teeth lanceolate, erect, glabrous; corolla-tube .5 in. long or more, the lobes narrow; leaves elliptic-lanceolate, prominently glandular; corymbs lax, the pedicels long and slender.....6. *Wightii*.

1. PAVETTA INDICA, Linn.; F. B. I. iii. 150; W. & A. 431; Wt. Ic. t. 148.

All forest Districts, in the undergrowth of deciduous forests and usually in ravines, up to 3,000 ft. in the hills.

A small tree or large shrub with pretty white flowers and very variable leaves.

Var. *tomentosa*, Hook. f.; F. B. I. iii. 150. *P. tomentosa*, Roxb.; W. & A. 431. *P. Brunonis*, Wt. Ic. t. 1065. Leaves beneath and inflorescence softly tomentose, otherwise similar.

All forest Districts equally with the above.

Var. *montana*, Thw.; F. B. I. iii. 150. Leaves elliptic, obtuse or obtusely acute, corolla-tube short.

Kollimalai Hills, Trichinopoly (K. Rungachari).

Var. *minor*, Hook. f.; F. B. I. iii. 150. Leaves lanceolate or narrowly obovate, the inflorescence fewer-flowered.

Hills of Madura and Tinnevely up to 3,000 ft.

2. PAVETTA HISPIDULA, W. & A. 431; F. B. I. iii. 151.

W. Gháts, in evergreen forests from S. Canara southwards, up to about 3,000 ft.

A narrow-leaved shrub with yellowish long-tubed flowers and prominent long styles.

3. PAVETTA ZEYLANICA, Gamble. *Pavetta hispidula* var. *zeylanica*, Hook. f.; F. B. I. iii. 151.

W. Gháts, in Wynaad, the Atapadi Hills of Malabar and hills of Tinnevely, up to 3,000 ft., in evergreen forests.

A large shrub with oblong leaves and long-tubed flowers with prominent styles.

4. PAVETTA BREVIFLORA, DC.; F. B. I. iii. 151; Wt. Ic. t. 1035.

W. Gháts, in the Nilgiri and Pulney Hills, in Shola forests above 5,000 ft., in undergrowth; Mahendragiri Hill in Ganjam, at 4,500 ft. (Gamble).

A pretty shrub with white flowers and thin leaves. Bark greyish-white; wood white, hard and close-grained. As noted by Wight, the calyx-lobes, usually glabrous, are sometimes ciliate.

Var. *subcoriacea*, Gamble. Leaves much thicker, also the calyx-lobes, and the tube of the corolla longer. Here, too, the calyx-lobes are sometimes ciliate.

Hills of Travancore and Tinnevely, in evergreen forests above 4,000 ft., Bababudan Hills of Mysore at 6,000 ft. (Meebold).

5. PAVETTA BRUNONIS, Wall; F. B. I. iii. 152.

W. Gháts, N. and W. slopes of Nilgiris at 5,000—6,000 ft.

A softly-tomentose shrub.

6. PAVETTA WIGHTII, Hook. f.; F. B. I. iii. 152.

W. Gháts, E. side of Nilgiri Hills at about 4,000—6,000 ft.

A shrub with rather large obovate leaves, prominently glandular.

31. *Stylocoryne*, W. & A.

Trees or shrubs, unarmed. *Leaves* petioled, usually black when dry; stipules interpetiolar. *Flowers* white or greenish, in terminal cymose corymbs. *Calyx*-tube turbinate, 5-toothed. *Corolla*-tube cylindrical, limb hypocrateriform with 5 imbricate lobes. *Stamens* 5, inserted on the mouth of the corolla-tube; anthers linear, exserted. *Ovary* 2-celled, ovules 1 or 2 in each cell, sunk in a fleshy axilely attached placenta; style slender, often hairy; stigma fusiform. *Fruit* a glabrous 2-celled berry, 1—2-seeded. *Seed* rounded, albumen fleshy, cotyledons small, foliaceous.

Ovules 2 in each cell; corolla-tube longer than the lobes; leaves oblanceolate, acuminate, thin, 4—9 in. long, 1—1.25 in. broad; berry white, .3 in. in diam.; seed 1.....1. *monosperma*.

Ovule 1 in each cell, seeds 2:—

Tube of corolla shorter than the lobes; leaves lanceolate or oblanceolate, obtusely acute, coriaceous, 2—4 in. long, .5—1 in. broad; berry ovoid.....2. *lucens*.

Tube of corolla equal to or longer than the lobes, .5—8 in. long, thick; leaves oblanceolate, acuminate, 6—12 in. long, 2—3.5 in. broad, the nerves distant, nearly black when dry; cymes and calyx-tube glabrous.....3. *canarica*.
 Tube of corolla longer than the lobes, 1 in. long or more, slender; leaves oblanceolate, caudate-acuminate, 4—9 in. long, 1.5—2.5 in. broad, the nerves rather close, olive-green when dry; cymes and calyx-tube pubescent....4. *nilagirica*.

1. *STYLOCORYNE MONOSPERMA*, W. & A. 401; Wt. Ic. t. 317.
Webera monosperma, Hook. f.; F. B. I. iii. 103.
 W. Gháts, about Courtallum in Tinnevely (Wight): Travancore Hills, at 2,000 ft. (Lawson).
 A shrub with large leaves and white fleshy berry.
2. *STYLOCORYNE LUCENS*, Gamble n. comb. *Webera lucens*, Hook. f.; F. B. I. iii. 106. *Coffea alpestris*, Wt. Ic. t. 1040, Spic. Neilgh. t. 100. *C. grumelioides*, Wt. Ic. t. 1041, Spic. Neilgh. t. 101.
 W. Gháts, Shola forests of the Kundahs in Nilgiris, above 7,000 ft.; hills of Tinnevely and Travancore.
 A bushy shrub with shining leaves, the flowers white.
3. *STYLOCORYNE CANARICA*, Gamble n. comb. *Webera canarica*, Hook. f.; F. B. I. iii. 106.
 W. Gháts, evergreen forests from S. Canara to Tinnevely and Travancore, at moderate elevations.
 A handsome shrub with large flowers and leaves.
4. *STYLOCORYNE NILAGIRICA*, Gamble n. comb. *Webera nilagirica*, Hook. f.; F. B. I. iii. 107.
 W. Gháts, in Sholas from W. Nilgiris to Travancore; Atapadi Hills of Malabar, at 3,000 ft.
 A shrub with long-tubed flowers.

32. *Coffea*, Linn.

Shrubs. *Leaves* opposite, rarely ternate; stipules broad, interpetiolar. *Flowers* in axillary fascicles or cymes or solitary; bracteoles connate in a single or double calyculus, often glandular within. *Calyx*-tube short; limb short, turbinate, often glandular within, lobes 4—5 or irregularly many-toothed. *Corolla*-tube short or long; lobes 4—5, twisted in bud, then spreading. *Stamens* 4—5; filaments short or 0; anthers linear, attached to the throat of the corolla-tube. *Ovary* 2-celled; ovules solitary in each cell, peltate on the septum; style slender, bifid at apex, the lobes linear. *Fruit* a small drupe with 2 plano-convex or ventrally concave cartilaginous or bony pyrenes. *Seeds* concave or grooved ventrally, the testa membranous; albumen horny; embryo short, sub-basal; cotyledons cordate, thin; radicle thick, inferior.

Corolla-tube long, slender; lobes 5; fruit usually didymous:—

Leaves large, shining, ovate-oblong; flowers appearing with the leaves; corolla-tube short, the lobes longer than the tube; fruit obovoid, .5 in. long...1. *arabica*.

Leaves usually dull and small; corolla salver-shaped, the tube long and slender:—

Flowers appearing before the leaves; calyx-limb many-toothed and usually red-glandular; stipules spinescent, pyrenes cartilaginous:—

Leaves membranous, elliptic, acuminate at apex and base, 3 in. long or longer; fruit ovoid-oblong or obovoid, sub-didymous, .4 in. long

2. *bengalensis*.

Leaves subcoriaceous, ovate, .5—1.5 in. long; fruit didymous, .25 in. long, .35 in. broad.....3. *Wightiana*.

Flowers appearing with the leaves; calyx-limb entire or toothed, often red-glandular; stipules shortly pointed; fruit obovoid, .35 in. long, the pyrenes bony; leaves membranous, lanceolate, acuminate, up to 4 in. long

4. *travancorensis*.

Corolla-tube very short, lobes 4; leaves coriaceous, shining, elliptic, about 3 in. long, 1.5 in. broad; stipules triangular, acuminate; fruit ellipsoid, .3—4 in. long, the seeds rugose.....5. *crassifolia*.

1. *COFFEA ARABICA*, Linn.; F. B. I. iii. 153; W. & A. 435; Wt. Ic. t. 53.
Cultivated and often found run wild in the hills of the W. Gháts. The Coffee plant.

A large shrub with white flowers, formerly much cultivated, less so at present, since a fungoid disease ruined many plantations.

2. *COFFEA BENGALENSIS*, Roxb.; F. B. I. iii. 153; W. & A. 435.
E. Gháts, hills of Ganjam (Barber).

A shrub with slender branches and fragrant white flowers.

3. *COFFEA WIGHTIANA*, W. & A. 436; F. B. I. iii. 154; Wt. Ic. t. 1598.
Deccan and Carnatic, near the E. foot of the Gháts, on dry lands.

A branching almost thorny shrub with pale divaricate branches and white flowers.

4. *COFFEA TRAVANCORENSIS*, W. & A. 345; F. B. I. iii. 154; Trim. Fl. Ceyl. t. 53; Hook. Bot. Mag. 6749.

W. Gháts, in Malabar and Travancore, in forest undergrowth, up to 3,000 ft., the flowers white and sweet-scented.

A slender undershrub with thin leaves and white flowers.

5. *COFFEA CRASSIFOLIA*, Gamble in Kew Bull. 1920, 248.

W. Gháts, in the Anamalai Hills and hills of Travancore, at about 4,500 ft.

A stiff shrub with thick branches and leaves and very small greenish flowers.

Coffea liberica, Hiern, the Liberian coffee, is often planted, and has in some places replaced the Arabian plant.

33. *Psychotria*, Linn.

Small trees or shrubs, rarely herbs, erect or rarely climbing. *Leaves* opposite, rarely whorled, often pitted in the nerve-axils; stipules intrapetiolar, often connate, solitary or in pairs, often with glandular hairs within. *Flowers* in terminal, rarely axillary, cymes heads or fascicles, bracteate and bracteolate or not. *Calyx*-limb short, lobes usually small, usually persistent in fruit. *Corolla*-tube short, straight, usually with a ring of hairs within; lobes 5, rarely 4 or 6, valvate in bud. *Stamens* as many as the corolla-lobes, inserted on the throat or mouth of the corolla; anthers oblong or linear. *Ovary* 2-celled; ovules solitary in each cell, basal, erect; style short, with 2 stigmatic branches. *Fruit* ovoid, globose or oblong, with two plano-convex pyrenes, each 1-seeded, the pyrenes smooth or furrowed. *Seeds* plano-convex, often furrowed, the face usually flat; testa thin; albumen ruminant or not; cotyledons leafy, small; radicle inferior.

Pyrenes plano-convex, usually dorsally smooth, ventrally flat, albumen ruminat:—

Flowers mixed with rufous hairs; stipules with long hairs within:—

Inflorescence globular-capitate, pedunculate; calyx-lobes broadly obovate ciliate; leaves oblong-oblancheolate, abruptly acute, up to 6 in. long by 1·5–2 in. broad, with 12–18 pairs of scarcely prominent nerves, olive-green when dry.....1. *globicephala*.

Branches of inflorescence whorled, the end ones capitate, calyx-lobes triangular; leaves obovate or oblanceolate, abruptly acuminate, up to 8 in. long, 3 in. broad, with 12–15 pairs of prominent nerves looped near the margin, greenish when dry.....2. *Thwaitesii*.

Branches of inflorescence opposite, the end ones cymose, calyx-lobes minute; leaves obovate or oblanceolate, abruptly acuminate, up to 5 in. long, 1·5 in. broad, with about 8–10 pairs of prominent looped nerves, yellowish when dry.....3. *Johnsoni*.

Flowers not mixed with rufous hairs:—

Branches of inflorescence whorled:—

Nerves of the obovate leaves strong and parallel:—

Bracts and bracteoles large and persistent, calyx-tube broadly campanulate, the lobes obtuse and emarginate; leaves coriaceous, large, obtuse, with 12–20 pairs of strong nerves, up to 10 in. long, 3·5 in. broad...4. *Dalzellii*.

Bracts and bracteoles none or very early deciduous:—

Leaves rather small, under 5 in. long, about 1·5 in. broad, cuneate at base, rounded and then acute at apex, nerves 8–12 pairs, stipules ovate, densely woolly within; calyx-teeth rounded or acute, ciliate; cymes usually closely congested, 1 in. broad.....5. *congesta*.

Leaves large, up to 8 in. long, 4 in. broad, cuneate at base, rounded and very shortly apiculate at apex, nerves 10–14 pairs, regularly curved, stipules large, oblong; calyx-limb truncate; cymes spreading, 4 in. in diam. in fruit.....6. *truncata*.

Nerves of the oblanceolate or oblong leaves parallel but weak:—

Leaf-nerves close, 3 in. apart on midrib, the leaves dark when dry and wrinkled, much cuneate at base, acute at apex; corolla-tube long, cylindric, glabrous within, calyx-limb truncate; fruit moderate-sized, globose.....7. *nudiflora*.

Leaf-nerves distant, 5 in. or more apart on midrib, the leaves olive-green when dry, slightly cuneate at base, obtuse or obtusely acute at apex; corolla-tube very short, woolly within; calyx-limb shortly lobed; fruit large, ellipsoid.....8. *macrocarpa*.

Branches of inflorescence opposite:—

Inflorescence spreading, corymbiform:—

Leaf-nerves many, rather close, up to 5 in. apart on midrib, parallel, the leaves elliptic-oblong, coriaceous, acute at apex short-petioled; all the cyme branches spreading; the ultimate branchlets cymose.....9. *flavida*.

Leaf-nerves few, distant, over 5 in. apart on midrib, irregular; the leaves elliptic-lanceolate, membranous, obtusely acute, or obtuse at apex, long-petioled; lower pair of cyme-branches long-spreading, ultimate branchlets with capitate flowers.....10. *subintegra*.

Inflorescence elongate, racemiform, the branches short; leaves obovate or oblanceolate, cuneate at base, the 10–20 pairs of nerves parallel, about 3–4 in. apart on the midrib; calyx-lobes short; fruit globose, 25 in. in diam.....11. *elongata*.

Pyrenes plano-convex, smooth or furrowed on the back, albumen not ruminat:—

Pyrenes with two furrows on the back:—

Bracts and bracteoles conspicuous, persistent and connate, lanceolate, acuminate; cymes large, terminal and axillary, spreading, corymbose, the flowers small; leaves coriaceous, shining, oblanceolate, acuminate, up to 7 in. long, 2·5 in. broad, with about 12 pairs of nerves.....12. *connata*.

Bracts and bracteoles inconspicuous or 0:—

Leaves short-petioled, obovate, cuneate at base, 2–5 in. long, 1–2 in. broad, glabrous, with about 8 pairs of nerves; cymes terminal, small, scarcely 1 in. in diam.; fruit about 4 in. long.....13. *bisulcata*.

Leaves very long-petioled, oblanceolate, much narrowed at base, 8–10 in.

long, 2—2.5 in. broad, glabrous, nerves 8—12 pairs; cymes large, terminal, corymbose, about 3 in. in diam.; fruit oblong, .6 in. long, the dorsal ridge very prominent.....14. *anomalayana*.

Pyrenes with 4 furrows on the back:—

Climbing shrub; leaves elliptic or elliptic-obovate, acute, up to 3.5 in. long, 1.5 in. broad; cymes corymbose, about 3 in. in diam., the pedicels curved; fruit .2 in. long, strongly ribbed.....15. *sarmentosa*.

Erect shrubs:—

Leaves long-petioled, membranous, broadly obovate, abruptly apiculate, up to 6 in. long, 3.5 in. broad, glabrous, with about 15 pairs of nerves; cymes corymbose, 3.5 in. in diam.; calyx-lobes lanceolate; fruit .4 in. long, strongly 4-furrowed, crowned by the persistent calyx-lobes.....16. *Barberi*.

Leaves long-petioled, submembranous, elliptic or elliptic-obovate, rusty pubescent beneath on the nerves (16 or more pairs), pubescent between them; cymes globose, pedunculate or sessile, with prominent bracts and bracteoles, densely rufous-villous; calyx-lobes lanceolate, villous; fruit .2 in. long, villous, deeply furrowed.....17. *fulva*.

Leaves with petioles up to .5 in. long, submembranous, obovate or oblanceolate, abruptly acuminate, glabrous, 3—6 in. long, 1—2 in. broad; cymes spreading, corymbose, the branches flattened; calyx-lobes minute, triangular; fruit obovoid, .3 in. long, prominently ridged and rugose.....18. *octosulcata*.

1. *PSYCHOTRIA GLOBICEPHALA*, Gamble in Kew Bull. 1920, 249. W. Ghâts, hills of Courtallum in Tinnevely (Wight).
A shrub conspicuous for its globose flower-heads and longish leaves.
2. *PSYCHOTRIA THWAITESII*, Hook. f.; F. B. I. iii. 162. *Grumilea nigra*, Gaertn. Fruct. 138. t. 28. ?.
W. Ghâts, especially in the Anamalais and the hills of Travancore and Tinnevely, up to 5,000 ft., in damp forests.
A glabrous shrub with greenish flowers.
3. *PSYCHOTRIA JOHNSONI*, Hook. f.; F. B. I. iii. 175.
W. Coast, in Malabar and Cochin extending inland to the Atamalai hills of Coimbatore and Sispara Ghât in Nilgiris to about 5,000 ft.
A glabrous shrub.
4. *PSYCHOTRIA DALZELLII*, Hook. f.; F. B. I. iii. 163. *P. bracteata*, W. & A. 434, *not of* DC.
W. Coast, in S. Canara, Malabar and Cochin.
A stout glabrous shrub, the fruit .4 in. long crowned by the calyx-teeth, the bracts prominent, as are the stipules.
5. *PSYCHOTRIA CONGESTA*, Hook. f.; F. B. I. iii. 162. *Grumilea congesta*, W. & A. 432; Wt. Ic. t. 1037.
W. Ghâts, in Sholas of the Nilgiris and Pulneys, above 7,000 ft., common on Doddabetta.
A large shrub or small tree with purplish-black fruit and greenish-white flowers. Bark light brown, smooth; wood white and close-grained.
Var. *astephana*, Hook. f. Cymes less crowded and longer peduncled.
Pulney Hills, with the common form.
6. *PSYCHOTRIA TRUNCATA*, Wall.; F. B. I. iii. 163; W. & A. 433.
W. Ghâts, from S. Canara and the Babahudan Hills of Mysore southwards to the Nilgiris and the Atamalai Sholas of Coimbatore, at 4,000—6,000 ft.

A large and handsome shrub with waxy-white corolla and black fruits.

7. *PSYCHOTRIA NUDIFLORA*, W. & A. 434; F. B. I. iii. 175.
W. Gháts, hills of Tinnevely and Travancore, about 4,000—6,000 ft., common about Courtallum.
A large glabrous shrub.
8. *PSYCHOTRIA MACROCARPA*, Hook. f.; F. B. I. iii. 162.
W. Gháts, hills of Travancore and Tinnevely, about 2,000—4,000 ft.
A large shrub with pale branchlets.
9. *PSYCHOTRIA FLAVIDA*, Talbot Trees and Shrubs Bomb. ed. 1, 113.
W. Gháts, and W. Coast from S. Canara to Travancore.
A small shrub, the cyme branches turning yellow in fruit.
10. *PSYCHOTRIA SUBINTEGRA*, Hook. f.; F. B. I. iii. 162. *Grumilea subinteger*, W. & A. 432.
W. Gháts, Pulney Hills and Sivagiri Hills of Tinnevely.
A large shrub, the cyme rhachis arrested above the lowest pair of branches.
11. *PSYCHOTRIA ELONGATA*, Hook. f.; F. B. I. iii. 163. *Grumilea elongata*, Wt. Ic. t. 1036.
W. Gháts, Nilgiris, Anamalais, Pulneys and hills of Tinnevely and Travancore, about 4,000—7,000 ft., in Shola forests.
A large shrub, the pits in the nerve-axils of the leaves very conspicuous, the stipules sheathing, the flowers greenish. Bark brown, thin; wood reddish-white, close-grained.
12. *PSYCHOTRIA CONNATA*, Wall.; F. B. I. iii. 171; W. & A. 433. *P. laevigata*, W. & A. 433; Wt. Ic. t. 828.
W. Gháts, hills of Travancore and Tinnevely, about 4,000—6,000 ft., in evergreen forests.
A glabrous shrub, the pyrenes with 2 deep furrows.
13. *PSYCHOTRIA BISULCATA*, W. & A. 434; F. B. I. iii. 171; Wt. Ic. t. 1039; Trimen Fl. Ceyl. t. 54.
W. Ghats, Nilgiri Sholas, above 4,000 ft., common.
A large shrub with greenish flowers and purplish-black fruit. Bark light brown, corky; wood grey, moderately hard.
14. *PSYCHOTRIA ANAMALLAYANA*, Bedd. Ic. t. 236; F. B. I. iii. 171.
W. Gháts, Anamalai Hills and hills of Travancore, at 3,000—4,500 ft., generally on river banks.
A small tree with white flowers and purple fruit.
15. *PSYCHOTRIA SARMENTOSA*, Bl.; F. B. I. iii. 165; Wt. Ic. t. 1038.
W. Coast, in Malabar, apparently scarce; W. Gháts.
A climbing and rooting plant with white fleshy fruit; the ribs and furrows only showing when dry.
16. *PSYCHOTRIA BARBERI*, Gamble in Kew Bull. 1920, 248.
W. Gháts, Anamalai Hills (Barber), Travancore Hills at 4,500 ft. (Venkoba Row).
A shrub, the leaves black when dry.

17. *PSYCHOTRIA FULVA*, Ham.; F. B. I. iii. 169.

E. Gháts, Gudem and Gomanji in the hills of Vizagapatam, to 4,000 ft. (A. W. Lushington).

A large shrub with large membranous rusty-pubescent leaves and yellowish flowers on pedunculate cymes.

Var. *madraspatana*. *P. madraspatana*, Hook. f.; F. B. I. iii. 167.

A stouter plant with larger leaves and flowers in sessile heads (Herb. Madras in Wall. Coll. 8366).

E. Gháts, Onjeri in the Vizagapatam Hills at 3,800 ft. (A. W. Lushington).

18. *PSYCHOTRIA OCTOSULCATA*, Talbot in Journ. Bomb. Nat. Hist. Soc. xi. 237, t. 7.

W. Gháts, Maliyamadurgam, Coimbatore, 4,000 ft. (Fischer), Kotagiri Ghát in Nilgiris, 2,300 ft. (Fischer).

An erect shrub with pale leaves, white flowers and black fruit.

34. *Chasalia*, Comm.

Shrubs or small trees; branchlets terete. Leaves opposite or ternately whorled, petiolate; stipules intrapetiolar, usually bifid. Flowers in terminal cymes; bracts and bracteoles small. Calyx-tube ovoid or subglobose, lobes 5, short. Corolla-tube elongate, slender and usually curved; lobes 5, short, valvate. Stamens 5, inserted in the corolla-tube; anthers long; filaments short or 0. Disk large, annular or tumid. Ovary 2-celled; ovule 1 in each cell, erect; style long, with 2 stigmatic lobes. Fruit dry or slightly fleshy, of 2 pyrenes, ventrally grooved, dorsally rounded. Seeds orbicular, rounded on the back, ventrally very concave; testa membranous; albumen horny; cotyledons broad; radicle terete, inferior.

CHASALIA CURVIFLORA, Thw.; F. B. I. iii. 176. *Psychotria curviflora*, Wall. in Roxb. Fl. Ind. Ed. Carey & Wall. ii. 167. *Psychotria ambigua*, W. & A. 433; Wt. Ill. t. 127.

E. Gháts, hills of Vizagapatam at about 3,000 ft.; W. Gháts, in all Districts, in evergreen forests up to 5,000 ft., common.

A small shrub with membranous leaves very variable in size and shape, but usually elliptic-lanceolate or -oblanceolate, acuminate at apex, much narrowed at base to a long slender petiole; flowers pinkish-white; fruit purplish-black.

35. *Geophila*, D. Don.

Small, slender, perennial herbs, creeping and rooting. Leaves long-petioled; stipules interpetiolar, entire. Flowers small, solitary or umbelled, subsessile or on axillary or terminal peduncles; bracts subulate, linear or leafy. Calyx-tube obovoid; limb short, 5-7-lobed, the lobes persistent. Corolla elongate, funnel-shaped, the throat hairy; lobes 5-7, spreading or recurved, valvate. Stamens 4-7, inserted on the corolla-tube; filaments filiform; anthers linear. Ovary 2-celled; ovule 1 in each cell, erect; style slender, with 2 stigmatic branches. Fruit a fleshy drupe with 2 plano-convex pyrenes; testa membranous; albumen horny; embryo minute; radicle inferior.

GEOPHILA RENIFORMIS, D. Don ; F. B. I. iii. 178 ; W. & A. 436 ; Wt. Ic. t. 54.

W. Ghâts, in most Districts, about 2,000—5,000 ft., not common. Leaves small, orbicular, cordate, on long petioles ; fruit scarlet when ripe.

36. *Fergusonia*, Hook. f.

A slender prostrate herb, the stems rooting from the lower nodes ; branchlets acutely 4-angled, the nodes ciliate. Leaves subsessile, lanceolate, scabrous, 1-nerved ; stipules connate with the petioles, lanceolate, bristly-ciliate, persistent. Flowers small, axillary, shortly pedicelled ; bracteoles 2. Calyx-tube campanulate ; lobes 4, erect, lanceolate, bristly-ciliate, persistent. Corolla-tube funnel-shaped, usually villous at the throat within ; lobes 4, ovate, acute, valvate, the tips ciliate. Stamens 4, inserted between the corolla-lobes ; filaments short ; anthers linear-oblong. Ovary 4-celled, ovule 1 in each cell, erect ; style filiform with 2 stigmatic lobes. Fruit of 4 separable cocci, each crowned by 1 calyx-lobe. Seeds oblong ; albumen fleshy ; cotyledons ovate, small ; radicle inferior.

FERGUSONIA TETRACocca, Baill. *F. zeylanica*, Hook. f. ; F. B. I. iii. 48. *Borreria tetracocca*, Thw. ; Bedd. Ic. t. 39.

W. Ghâts, in Coorg (Beddome) ; S. Canara (Barber) ; Travancore (K. Rangachari).

A scabrous herb, in appearance like *Oldenlandia nitida*.

37. *Lasianthus*, Jack.

Shrubs, often bad-smelling ; branchlets terete, compressed at the nodes. Leaves distichous, shortly petioled, with arching nerves, the last pair often to the apex, and usually closely-set transverse nervules ; stipules interpetiolar, usually broad. Flowers small, in axillary, rarely peduncled, often bracteate, clustered cymes or heads. Calyx-tube subglobose, ovoid or oblong ; limb short or long ; lobes 3—7, valvate in bud, or 0. Corolla funnel- or salver-shaped, the throat villous ; lobes 3—7, valvate. Stamens on the throat of the corolla ; filaments short ; anthers oblong, often apiculate, included. Ovary 4—9-celled ; ovules solitary in each cell, erect ; style short or long, with 3—9 short, obtuse, stigmatic lobes. Fruit a drupe of 4—9 pyrenes ; pyrenes triquetrous, crustaceous or bony, usually rugose. Seeds narrow ; testa membranous ; albumen fleshy ; embryo oblong, curved, with short obtuse cotyledons and slender inferior radicle.

Cymes sessile, bracteate :—

Bracts conspicuous, longer than the flowers, lanceolate ; branchlets softly hirsute ; leaves subsessile, oblong or somewhat oblanceolate ; abruptly and sharply caudate-acuminate at apex, rounded at base, 4—6 in. long, 1.5—2.5 in. broad, nerves 6—7 pairs, transverse nervules subparallel, little branched ; calyx-teeth ovate-lanceolate.....1. *Jackianus*.
Bracts inconspicuous, shorter than the flowers, ovate ; branchlets glabrous, rest slightly strigose-villous ; leaves shortly petioled, oblong or elliptic-oblong, abruptly caudate-acuminate at apex, rounded or acute at base, 6—7 in. long, 2—2.5 in. broad, nerves 7 pairs, transverse nervules close, little branched, very prominent beneath ; calyx-teeth triangular-lanceolate.....2. *oblongifolius*.

Cymes sessile, with minute or no bracts:—

Calyx-limb and -teeth glabrous or very slightly hairy only:—

Calyx-teeth erect, lanceolate, with few hairs near the tip, .2 in. long; branchlets glabrous; leaves stoutly petioled, elliptic, abruptly caudate-acuminate at apex, 3—6 in. long, 1—2 in. broad, nerves 5 pairs, prominent, arching, the last pair and the midrib running to the apex, transverse nervules horizontal, slender, nearly straight.....3. *Blumeanus*.

Calyx-teeth ovate, acute, puberulous, .05—0.75 in. long; branchlets black, glabrous; leaves obovate, obtuse, coriaceous, 1 in. long, .7 in. broad, the margins recurved, nerves 4—5 pairs, indistinct, as are the transverse nervules.....4. *obovatus*.

Calyx-teeth minute, obtuse, slightly puberulous only; branchlets glabrous; leaves petioled, small, obovate, abruptly acuminate and mucronate at apex, acute at base, 1.5—2 in. long, .6—1 in. broad, nerves 3—4 pairs, prominent, arching, transverse nervules horizontal, very many, forked, indistinct.....5. *parvifolius*.

Calyx-limb truncate; branchlets pubescent; leaves lanceolate, acuminate at both ends, mucronate at apex, 5—6 in. long, 1—1.5 in. broad, nerves 7—10 pairs, transverse nervules horizontal, prominent, parallel, about 12 per inch.....6. *truncatus*.

Calyx-limb and -teeth hairy:—

Leaves and branchlets glabrous or nearly so, transverse nervules horizontal, very many and close:—

Leaves elliptic or elliptic-obovate, abruptly acuminate, sharply mucronate, 3—4 in. long, up to 2 in. broad, nerves 3—6 pairs, arching; calyx-teeth very short, villous, triangular.....7. *acuminatus*.

Leaves lanceolate or oblong-lanceolate, acuminate, mucronate, 3—4.5 in. long, .75—1.5 in. broad, nerves 6—9 pairs, ascending; calyx-teeth lanceolate, villous.....8. *coffeoides*.

Leaves and branchlets more or less pubescent:—

Leaves beneath and branchlets merely closely appressed pubescent; leaves petioled, narrowly oblong-lanceolate, acuminate, 4—6 in. long, 1—1.5 in. broad, nerves 7—8 pairs, ascending, transverse nervules close and regular; calyx-teeth minute, triangular, hispid.....9. *strigillosus*.

Leaves beneath and branchlets hirsute with spreading hairs:—

Calyx-lobes oblong, .1 in. long, hispid; leaves elliptic-oblong, acute or acuminate, margins ciliate, 4—7 in. long, 1.5—2 in. broad, nerves 6—8 pairs, ascending, the uppermost ones to the apex, transverse nervules stout, distant.....10. *ciliatus*.

Calyx-lobes triangular, acute, .05 in. long, softly villous; leaves elliptic lanceolate or oblanceolate, cuspidate-acuminate, 3—6 in. long, 1.5 in. broad, nerves about 7 pairs, the uppermost pair to the apex, transverse nervules slender though distant.....11. *rostratus*.

Cymes peduncled:—

Cymes with slender peduncles, the transverse nervules parallel:—

Cymes dichotomous, at least 1 in. long; calyx-lobes long lanceolate, with setose tips; leaves thin, glabrous, ovate acuminate, rounded or cordate at base, 2—4 in. long, 1—nearly 2 in. broad, nerves 6—8 pairs, slender, transverse nervules very many, close-set and parallel, not prominent.....12. *dichotomus*.

Cymes about .5 in. long, cinereous; calyx-lobes lanceolate, villous and setose; leaves subcoriaceous, grey-puberulous, oblong-lanceolate, caudate-acuminate and mucronate, 3—3.5 in. long, 1—1.5 in. broad, nerves 3—4 pairs; transverse nervules more distant, subparallel.....13. *cinereus*.

Cymes with short peduncles, the transverse nervules reticulate:—

Calyx-lobes erect, subulate, hirsute, .2—2.5 in. long; leaves variable, elliptic ovate or oblong, acute acuminate or apiculate at apex, rounded at base, 1—4.5 in., long, 1—2 in. broad, nerves spreading, nervules much reticulate.....14. *venulosus*.

Calyx-lobes recurved, ovate, obtuse, hirsute, .05—1 in. long; leaves variable, elliptic-ovate or oblong-lanceolate, acute at apex, acute or rounded at base, 4—6 in. long, 1—1.5 in. broad, nerves ascending, nervules less reticulate, prominent.....15. *capitulatus*.

1. *LASIANTHUS JACKIANUS*, Wight; F. B. I. iii. 180; Bedd. Ic. t. 12.
W. Gháts, in W. Nilgiris, Wynaad and Atapadi Valley in Malabar, Bolúmpatti Valley in Coimbatore, at 3,000—5,000 ft., in evergreen forests.
An evergreen shrub, covered with bulbous-based strigose hairs.
2. *LASIANTHUS OBLONGIFOLIUS*, Bedd. Ic. t. 11; F. B. I. iii. 183.
W. Gháts, Papanasham Hills of Tinnevely, at 3,000—4,000 ft.
An evergreen shrub, the leaves very characteristic with prominent nervules.
3. *LASIANTHUS BLUMEANUS*, Wight; F. B. I. iii. 184; Bedd. Ic. t. 22.
W. Ghats, Courtallum in Tinnevely Hills at 3,500 ft., in evergreen forest.
An evergreen shrub, the calyx-lobes conspicuous.
4. *LASIANTHUS OBOVATUS*, Bedd. Ic. t. 10; F. B. I. iii. 186.
W. Gháts, Atraimalai Hills of Travancore at 5,000 ft. (Beddome).
A much-branched, compact, small-leaved shrub.
5. *LASIANTHUS PARVIFOLIUS*, Wight; F. B. I. iii. 186.
W. Gháts, in the Nilgiris, Anamalais, Pulneys and hills of Tinnevely about 4,000 ft.
A slender glabrous shrub with small shining leaves and few nerves.
6. *LASIANTHUS TRUNCATUS*, Bedd. Ic. t. 9; F. B. I. iii. 189.
E. Gháts, Mahendragiri Hill in Ganjam at 4,500 ft. (Beddome), hills of Vizagapatam, 3,500 ft. (A. W. Lushington).
A shrub with narrow leaves and subsolitary long flowers.
7. *LASIANTHUS ACUMINATUS*, Wight; F. B. I. iii. 185 *in part*.
W. Ghats, in the Nilgiris, Pulneys and hills of Tinnevely and Travancore, at 3,000—6,000 ft., in evergreen Sholas.
~~A slender shrub with shining leaves~~
8. *LASIANTHUS COFFEOIDES*, Fyson in Kew Bull. 1914, 185.
W. Gháts, in the Pulney Hills and hills of Travancore at 6,000—7,000 ft. in Shola forests.
A single-stemmed erect shrub with horizontal branches spreading like those of the coffee-plant. Very similar to the next species.
9. *LASIANTHUS STRIGILLOSUS*, Hook. f.; F. B. I. iii. 185.
W. Gháts, Courtallum Hills of Tinnevely.
A shrub with stiff leaves and well-marked nerves.
10. *LASIANTHUS CILIATUS*, Wight; F. B. I. iii. 184.
W. Gháts, Sholas about Sispara in W. Nilgiris at 5,000—6,000 ft.
A stout shrub with tawny brown rusty tomentum and prominent leaf-nerves.
11. *LASIANTHUS ROSTRATUS*, Wight. *L. ciliatus* var. *rostratus*, Hook. f.; F. B. I. iii. 185.
W. Gháts, hills of Madura, Tinnevely and Travancore, at 4,000—5,000 ft., in evergreen Sholas.
A large shrub with soft brown tawny pubescence, the leaves very long, acuminate.

12. *LASIANTHUS DICHOTOMUS*, Wight; F. B. I. iii. 191; Bedd. Ic. t. 13.
W. Gháts, Sivagiri and Courtallum Hills of Tinnevely (Wight, Beddome).
A nearly glabrous shrub.
13. *LASIANTHUS CINEREUS*, Gamble in Kew Bull. 1920, 249.
W. Gháts, hills of Tinnevely at Naterikal and Kalivayalpil (Barber, Rangachari).
A shrub, cinereous pubescent, and with elongate branchlets, the leaves few-nerved.
14. *LASIANTHUS VENULOSUS*, Wight; F. B. I. iii. 190; Wt. Ic. t. 1032.
Santia venulosa, W. & A. 422.
W. Gháts, in the upper Shola Forests of Nilgiris and Pulneys, above 6,000 ft., in underwood, common.
A large much-branching shrub with yellowish flowers and blue fruits, the leaves reticulate. Bark light brown, rough with corky protuberances; wood grey, close-grained.
15. *LASIANTHUS CAPITULATUS*, Wight; F. B. I. iii. 191.
W. Gháts, Brumagiri Hills of Mysore, Atamalai Hills of Coimbatore (Fischer), Nilgiris, especially about Sispara on West and Lamb's rock on East, in underwood of Shola forests at 4,000—6,000 ft., Pulney Hills (Bourne).
A large shrub, perhaps the largest S. Indian species, the leaves variable in shape and coriaceous.

38. *Saprosma*, Blume.

Shrubs, usually glabrous, bad-smelling when bruised. *Leaves* opposite or 3—4-whorled, sessile or petioled; stipules interpetiolar, connate, with stiff bristles on the margin, deciduous. *Flowers* axillary or terminal, solitary fascicled or in cymes; bracts and bracteoles minute, often connate. *Calyx*-tube obconic; limb dilated, 4—6-lobed, persistent. *Corolla*-tube funnel-shaped or campanulate, the throat villous; lobes 4—5, broad, obtuse, valvate with inflexed flat or crisped margins. *Stamens* 4—5, in the corolla-throat; filaments short or 0; anthers oblong. *Fruit* a drupe with 1—2 thin crustaceous pyrenes. *Seeds* erect, plano-convex, smooth; testa membranous; albumen fleshy; cotyledons small, foliaceous; radicle elongate, truncate, inferior.

Flowers in small axillary or terminal cymes; leaves opposite:—

- Leaves sessile or nearly so, one usually smaller, elliptic-ovate or obovate, acuminate, base rounded or subcordate, 2—5 in. long, 1—2 in. broad; flowers very small, terminal; seed 1, globose or ellipsoid.....1. *indicum*.
Leaves petioled, equal, elliptic or obovate, abruptly acuminate, narrowed at base; 3—4 in. long, 1.5—2 in. broad; flowers moderate-sized, the corolla-tube .5 in. long, in terminal cymes; seed 1.....2. *fragrans*.
Flowers in slender 1—3-flowered terminal or axillary cymes, the corolla-tube .5 in. long; leaves opposite, petioled, elliptic or lanceolate, acuminate, narrowed at base, 2—5 in. long, .75—2 in. broad; seeds 2.....3. *ceylanicum*.
Flowers in axillary or terminal corymbose cymes, the corolla-tube short; leaves 3—4-whorled, petioled, elliptic or lanceolate or oblanceolate, acuminate.....4. *corymbosum*.

1. *SAPROSMA INDICUM*, Dalz.; F. B. I. iii. 192. *Serissa glomerata*, Bedd. Ic. t. 16.

- W. Gháts, from S. Canara to Travancore, at 2,000—4,000 ft., in evergreen forests.
A shrub, 3—4 ft. high, with white flowers and blue drupe.
2. *SAPROSMA FRAGRANS*, Bedd.; F. B. I. iii. 193. *Serissa fragrans*, Bedd. Ic. t. 14.
W. Gháts, in W. Nilgiris, Malabar and Tinnevely Hills, at 2,000—4,000 ft.
A shrub, 10—12 ft. high, with white fragrant flowers; bad-smelling when crushed.
3. *SAPROSMA CEYLANICUM*, Bedd.; F. B. I. iii. 193. *Serissa Wightii*, Bedd. Ic. t. 15.
W. Gháts, in the Nilgiris, Anamalais and Tinnevely Hills, above 3,000 ft., in underwood of Shola forest.
A shrub, 8—12 ft. high, bad-smelling when bruised, with purplish flowers and deep blue drupe.
4. *SAPROSMA CORYMBOSUM*, Bedd.; F. B. I. iii. 194. *Serissa corymbosa*, Bedd. Ic. t. 17.
W. Gháts, in evergreen forests of the Tinnevely and Travancore Hills, at 2,500—4,000 ft.
A shrub with white flowers, the fruit so far unknown.

39. *Hamiltonia*, Roxb.

Erect shrubs with trichotomous branchlets, bad-smelling when bruised. *Leaves* opposite, rarely ternate, petioled; stipules intrapetiolar, short, acute, often glandular, persistent. *Flowers* in broad terminal trichotomously branched panicles or subumbellate cymes, fragrant; bracts lanceolate; bracteoles subulate. *Calyx*-tube ovoid; limb persistent with 4—5 subulate often glandular lobes. *Corolla* funnel-shaped; tube elongate; lobes 5, valvate. *Stamens* 5, adnate to the throat of the corolla; filaments short, subulate; anthers obovate-oblong, obtuse. *Ovary* 5-celled, the septa soon disappearing; ovule 1 in each cell, erect; style filiform with 5 linear stigmatic arms. *Fruit* a 1-celled capsule, 5-valved at top. *Seeds* 5 or less, 3-cornered; testa reticulate, splitting into 3—4 segments; cotyledons cordate, induplicate; radicle terete, inferior.

HAMILTONIA SUAVEOLENS, Roxb.; F. B. I. iii. 197. *H. mysorensis*, W. & A. 423. *Spermadictyon suaveolens*, Roxb. Cor. Pl. t. 236.

N. Circars and Deccan, in dry forests, south to Mysore, up to 4,500 ft.

A large shrub with white or blue flowers and rather large glabrous or pubescent leaves, up to 1 ft. in length. Bark grey, peeling off in papery flakes; wood dark grey, soft.

40. *Morinda*, Linn.

Erect or climbing shrubs or trees; branchlets terete or obscurely 4-gonous. *Leaves* opposite, rarely ternate; stipules connate, sheathing. *Flowers* in axillary or terminal, simple paniced or umbellate heads, the calices more or less coherent; bracts 0. *Calyx*-tube urceolate or hemispheric; limb short, truncate or occasionally with one large leafy

bract-like lobe. *Corolla*-tube more or less funnel-shaped, short or long; lobes 4 or 5, occasionally more, valvate in bud. *Stamens* as many as the corolla-lobes, on the throat of the corolla; filaments short; anthers linear or oblong. *Ovary* 2- or spuriously 4-celled; ovules solitary, ascending from near the base of the septum; style slender, with 2 stigmatic branches. *Fruit* a syncarpium formed by the succulent enlarged calices, showing many more or less 4-sided pyramidal sections each with 4 cartilaginous or bony pyrenes, rarely of nearly free drupes; the pyrenes often with an empty ventral cavity. *Seeds* oblong or obovoid; testa membranous, sometimes produced below in a reticulate wing; albumen fleshy or horny; cotyledons small; radicle long, inferior.

Trees or shrubs, erect; corolla-tube elongate:—

Pyrenes with an empty ventral cavity; seeds winged below; fruit about 1 in. in diam:—

Calyx-limb with or without a leafy bract-like lobe; leaves glabrous, shining, 5—9 in. long, 3—5 in. broad, elliptic, acute, nerves 8—10 pairs; stipules broad, obtuse; fruit white or greenish.....1. *citrifolia*.

Calyx-limb without a leafy lobe; leaves glabrous, up to 12 in. long, obovate or oblanceolate or lanceolate; nerves 10 pairs; stipules acute; fruit white.....2. *angustifolia*.

Pyrenes without an empty ventral cavity; seeds not winged; fruit usually less than .75 in. in diam.; leaves usually pubescent or tomentose, up to 6 in. long, various in shape; stipules usually bifid.....3. *tinctoria*.

Climbing shrubs; corolla-tube short, very hairy within; pyrenes pyriform, triquetrous; seeds not winged:—

Calyx-limb a mere rim, truncate; leaves elliptic-lanceolate or -oblanceolate, sometimes obovate, abruptly acuminate, usually pubescent, membranous, nerves 6—8 pairs at about 30° with mid-rib.....4. *umbellata*.

Calyx-limb a fleshy cushion-like ring; leaves oblanceolate or linear-oblong, abruptly caudate-acuminate, coriaceous, glabrous; nerves 10—12 pairs at about 60° with midrib, reticulation prominent.....5. *reticulata*.

1. MORINDA CITRIFOLIA, Linn; F. B. I. iii. 155; W. & A. 419. *M. bracteata*, Roxb.; W. & A. 419; Wt. Ill. t. 126.

N. Circars, in coast forests; W. Coast, in coast forests from S. Canara to Travancore; sometimes cultivated.

A small tree with white flowers and large fleshy fruit. The roots give a red dye from the wood. Bark yellowish-white. Vern. *Hind.* Al, Ak; *Ur.* Achu; *Tam.* Nuna; *Mal.* Manjanatthi.

2. MORINDA ANGUSTIFOLIA, Roxb. Cor. Pl. t. 237; F. B. I. iii. 156.

N. Circars, Vizianagram (J. Campbell); Nallamalai Hills of Kurnool (Barber).

A small tree with thicker leaves, prominently nerved.

3. MORINDA TINCTORIA, Roxb.; F. B. I. iii. 156; W. & A. 419. *M. exserta*, Roxb.; W. & A. 419. *M. citrifolia*, Bedd. Fl. t. 220, not of Linn.

S. Deccan and Carnatic to S. Travancore in dry forests, westwards to the E. slopes of the Ghâts, at low levels.

A moderate-sized deciduous tree. Vern. *Tel.* Togari, Maddi; *Tam.* Nuna.

Var. *tomentosa*, Hook. f.; F. B. I. iii. 156. *M. tomentosa*, Heyne; W. & A. 426. Leaves tomentose on both surfaces, larger and broader; corolla-tube more slender.

N. Circars and N. Deccan in dry forests, the common Northern form.

A moderate-sized deciduous tree. Bark corky, brown or grey; wood red or yellow, moderately hard. The root gives a red or yellow dye. Vern. *Ur.* Achu; *Tel.* Maddi.

Var. *stenophylla*, Gamble. *M. stenophylla*, Spr.; W. & A. 420. Leaves narrowly linear-oblong, tomentose, up to 6 in. long by 1 in. broad; stipules variable, sometimes long.

Chittoor and Tinnevely (Beddome).

4. *MORINDA UMBELLATA*, Linn.; F. B. I. iii. 157; W. & A. 420.

E. Gháts, Madgol Hills of Vizagapatam at 4,000—5,000 ft.; Deccan, Kambakam Hill in Chingleput, Horsleykonda in Chittoor at 4,000 ft., hills of N. Coimbatore; W. Gháts, in all Districts, up to 5,000 ft.

A diffuse, climbing shrub, with rather variable, usually membranous leaves and flowers in many-branched terminal umbels, the fruits occasionally separate.

5. *MORINDA RETICULATA*, Gamble in Kew Bull. 1920, 248.

W. Gháts, hills of Travancore at about 2,000 ft. (Bourdillon, Rama Row).

A climbing shrub with coriaceous shining reticulate leaves.

41. *Prismatomeris*, Thw.

Shrubs, the branchlets compressed tetragonous. *Leaves* lanceolate, petiolate; stipules interpetiolar, cuspidate. *Flowers* white, in axillary few-flowered fascicles or cymes, pedicels usually long. *Calyx*-limb cup-shaped, teeth 4—5, short. *Corolla*-tube cylindric; lobes 4—5, spreading, valvate in bud. *Stamens* 4—5, in the corolla-tube; filaments short; anthers linear, included. *Ovary* 2-celled, 1 ovule in each cell, the ovule pendulous, attached above the middle of the septum; style linear; stigmas 2, spreading. *Fruit* a small fleshy 1—2-celled, 1—2-seeded berry with 2 pyrenes. *Seeds* hemispheric, ventrally excavated; testa membranous; cotyledons small, reniform; radicle inferior.

PRISMATOMERIS ALBIDIFLORA, Thw.; F. B. I. iii. 159; Bedd. Ic. t. 93 (but *corolla*-lobes not imbricate).

Travancore, in evergreen forests at low elevations (Bourdillon).

A fragrant shrub with pretty white flowers and dark blue fruits.

42. *Hydrophylax*, Linn. f.

Succulent creeping herbs with rooting stems. *Leaves* sessile, ovate or obovate, often recurved; stipules connate with the petioles in an entire or toothed sheath. *Flowers* solitary, axillary, shortly pedicelled. *Calyx*-tube 4-angled; lobes 4, ovate-lanceolate, persistent. *Corolla* sub-fleshy, funnel-shaped, with a ring of hairs within; lobes 4, ovate, valvate. *Stamens* 4, exserted, on the throat of the corolla; filaments slender; anthers linear. *Ovary* 2-celled; ovule 1 in each cell, peltately attached to the septum; style filiform; stigma obscurely 2-lobed. *Fruit*

large, corky, compressed, acutely keeled, 1—2-celled, 2-seeded. *Seeds* linear oblong, dorsally convex, ventrally 2-grooved; testa granular; albumen cartilaginous; cotyledons thin, oblong; radicle terete, elongate, inferior.

HYDROPHYLAX MARITIMA, Linn. f.; Roxb. Cor. Pl. t. 233; F. B. I. iii. 199; W. & A. 441; Wt. Ic. t. 760.

East and West Coasts, on sand-dunes.

A succulent herb with lilac flowers and corky fruit; a useful sand-binding plant.

43. Borreria, G. F. W. Mey.

Annual or perennial herbs, the branches usually 4-gonous. *Leaves* opposite, sessile or petioled; stipules connate with the petioles in a broad truncate tube with marginal bristles. *Flowers* very small, in axillary or terminal fascicles; bracteoles many, of soft filiform bristles. *Calyx*-tube obovoid or turbinate; lobes 2—4, often with intermediate teeth or bristles. *Corolla* funnel-shaped or hypocrateriform; lobes 4, valvate. *Stamens* 4, on the throat or tube of the corolla; anthers linear or oblong. *Ovary* 2-celled; ovules solitary in each cell on septal placentas; style filiform with 2 short arms or stigma capitate. *Fruit* of 2 coriaceous or crustaceous mericarps which dehisce ventrally, the membranous septum sometimes remaining. *Seed* oblong, ventrally grooved; testa thin; albumen horny or fleshy; cotyledons small, foliaceous; radicle terete, inferior.

Stems erect; mericarps thinly crustaceous, dehiscing ventrally without a persistent septum:—

Slender little branched scabrid herbs with linear or lanceolate leaves...1. *stricta*.

Branching bushy nearly glabrous herbs with ovate obovate or lanceolate leaves

2. *ocymoides*.

Stems procumbent, hispid or scabrous, with usually long internodes; mericarps coriaceous, dehiscing ventrally, the septum persistent.....3. *hispida*.

1. BORRERIA STRICTA, K. Sch. *Spermacoce stricta*, Linn. f.; F. B. I. iii. 200. *Bigelovia lasiocarpa* and *Roxburghiana*, W. & A. 437.

All Districts, and up to 5,000 ft. in the hills, usually in forest undergrowth, common.

An erect herb, variable in leaf, flowers white, the tube short.

2. BORRERIA OCYMOIDES, DC. *Spermacoce ocymoides*, Burm.; F. B. I. iii. 200.

All Western Districts, in the hills to about 5,000 ft.

A branching herb, sometimes difficult to distinguish from *B. stricta*.

3. BORRERIA HISPIDA, K. Sch. *Spermacoce hispida*, Linn.; F. B. I. iii. 200; W. & A. 438.

All Districts, and up to about 3,000 ft. in the hills, common on the coast sands, also on all dry lands in the interior.

A hispid procumbent herb with long branches, pale mauve usually long-tubed flowers and hard fruits. Vern. *Tel. Madana*; *Tam. Nutti choori*.

44. *Rubia*, Linn.

Herbs, erect diffuse or climbing, hispid or prickly; stems slender, 4-gonous. *Leaves* in whorls of 4—8, rarely opposite; stipules none. *Flowers* very small, in axillary and terminal cymes, bracteolate; pedicels articulate below the ovary. *Calyx*-tube ovoid or globose; limb 0. *Corolla* rotate or shortly campanulate; lobes usually five, valvate. *Stamens* alternate with the corolla-lobes; filaments short; anthers globose or oblong. *Ovary* 2-celled; ovules solitary in the cells, attached to the septum; style bifid or styles 2; stigmas capitate. *Fruit* small, fleshy, didymous or globose by the suppression of 1 carpel. *Seed* sub-erect, adnate to the pericarp; testa membranous; albumen horny; embryo curved, the cotyledons thin, foliaceous; radicle slender, inferior.

RUBIA CORDIFOLIA, Linn.; F. B. I. iii. 202; W. & A. 442; Wt. Ill. t. 128, fig. 1. *R. Munjista*, Roxb.; Wt. Ic. t. 187.

N. Circars, hills of Ganjam to Godavari; Deccan and Carnatic, in hilly country; W. Gháts, in all Districts up to 7,000 ft. Indian Madder.

A climbing, very scabrous herb with ovate cordate 5—7-ribbed long-petioled leaves, small greenish flowers and purplish fruit. The roots give a valuable dye. Vern. *Hind.* Manji't; *Tel.* Mandesti; *Tam.* Manjiti.

45. *Galium*, Linn.

Herbs, erect or climbing; stems slender, weak, 4-gonous. *Leaves* 3 or more in a whorl with stipules 0, rarely opposite and stipulate. *Flowers* minute, in axillary or terminal cymes or panicles, white yellow or greenish, bracteolate; pedicels articulate below the ovary. *Calyx*-tube ovoid or globose, limb 0. *Corolla* rotate or shortly funnel-shaped; lobes 4, rarely 3, valvate. *Stamens* alternate with the corolla-lobes; filaments short; anthers didymous. *Ovary* 2-celled; ovules solitary in the cells, attached to the septum; style short, bifid; stigmas capitate. *Fruit* small, dry, didymous, smooth granulate or tubercled, glabrous or pubescent, often with hooked hairs. *Seed* adherent to the pericarp, plano-convex, ventrally grooved; testa membranous; albumen horny; embryo curved; cotyledons thin, foliaceous; radicle elongate, inferior. Leaves 4, ovate, apiculate, soft and softly hairy; fruit with hooked hairs.

Leaves 6—8, obovate or oblanceolate, apiculate, hard and scabrous; fruit glabrous; minutely granulate.....1. *javanicum*.
.....2. *asperifolium*.

1. *GALIUM JAVANICUM*, DC. *G. rotundifolium*, Linn. var. *javanicum*, Hook. f.; F. B. I. iii. 205. *G. Requienianum*, W. & A. 443; Wt. Ic. t. 1042 (except the hairs of the fruit).

W. Gháts, Nilgiris, Anamalais, Pulneys and hills of Tinnevely, above 6,000 ft.

A low-growing plant of grassy places.

2. *GALIUM ASPERIFOLIUM*, Wall.; W. & A. 442; Wt. Ill. t. 128, fig. 1. *G. Mollugo*, Hook. f.; F. B. I. iii. 207, not of Linn.

N. Circars, Mahendragiri Hill in Ganjam, 4,500 ft.; W. Gháts, Nilgiris and Pulneys, above 5,000 ft.

A scandent, rambling, scabrous herb.

Family LXXXIV. VALERIANACEAE.

Herbs, annual or perennial, or rarely shrubs. *Leaves* opposite, exstipulate, but often the petioles united at the base by a rim, entire pinnatifid or pinnate. *Flowers* sessile, cymose, sometimes polygamous or dioecious, bracteate. *Calyx*-tube adnate to the ovary; limb small, membranous, in fruit often enlarged or pappose. *Corolla* superior; tube equal or gibbous or spurred at the base; lobes 3—5, imbricate. *Stamens* 1—4, inserted on the corolla-tube, alternate with the lobes. *Ovary* 3-celled; cells 1-ovuled, or one 1-ovuled, the others imperfect; style filiform; stigmas 1—3, distinct or combined. *Fruit* dry, indehiscent, crowned with the limb of the calyx, 1-celled and 1-seeded. *Seed* pendulous; albumen 0 or scanty; embryo straight; cotyledons flat; radicle superior.

Valeriana, Linn.

Perennial herbs. *Leaves* entire pinnatifid or pinnate, the radical often long-petioled. *Flowers* in corymbosely paniced cymes; bracts small. *Calyx*-limb small, involute in flower, afterwards forming a deciduous pappus of many plumose bristles. *Corolla*-tube funnel-shaped, equal or gibbous at base; lobes 5, spreading, pink or white. *Stamens* 3. *Ovary* 3-celled, 1-ovuled; stigma shortly 2—3-fid or subentire. *Fruit* oblong, compressed, plano-convex, with 3 dorsal and 1 ventral rib, crowned with the plumose pappus.

Leaves simple or with sometimes one or two small leaflets below the end one, all entire or sometimes slightly sinuate on the margins, sparingly pubescent

1. *Leschenaultii*.

Leaves usually all pinnate:—

Radical leaves early deciduous, long-petioled, unequally pinnate, cauline with about 5—9 leaflets, the lowest pair alternate, the others opposite, all coarsely dentate, slightly acuminate, glabrous or puberulous.....2. *Arnottiana*.

Radical leaves persistent:—

Leaflets broad, ovate, usually crenate-dentate, softly puberulous, radical 1—5, the lowest pair often alternate, cauline 5—7.....3. *Hookeriana*.

Leaflets narrow, usually linear, the end one ovate, very many, opposite or the lower alternate, often with small intermediates to the larger ones, glabrous or softly puberulous, entire or few-dentate.....4. *Beddomei*.

1. VALERIANA LESCHENAUULTII, DC. ; F. B. I. 214 ; W. & A. 444 ; Wt. Ic. t. 1044. *V. Brunoniana*, W. & A. 443 ; Wt. Ic. t. 1043.

Nilgiri Hills, above 6,000 ft., on the downs, but usually on the margins of Shola forests.

A large perennial herb, the leaves quite simple in dry open places, slightly pinnate in moister ones. Flowers pink.

2. VALERIANA ARNOTTIANA, Wt. Ic. tt. 1045—6. *V. Hardwickii*, Wall., var. *Arnottiana*, C. B. Clarke ; F. B. I. iii. 213.

W. Gháts, Nilgiri, Anamalai and Pulney Hills, at 5,000—7,000 ft.

A tall-growing plant with thin, much-cut leaves and large panicles of white flowers.

3. VALERIANA HOOKERIANA, W. & A. 444 ; F. B. I. iii. 214 ; Wt. Ill. t. 129.

W. Gháts, Nilgiri Hills, on the downs above 6,000 ft.

A softly pubescent herb with white flowers.

4. VALERIANA BEDDOMEI, C. B. Clarke; F. B. I. iii. 214.
W. Ghâts, Anamalai and Pulney Hills about 7,000 ft.
A well-marked herb with many narrow leaflets.

Family LXXXV. DIPSACACEAE.

Perennial herbs, rarely shrubs. *Leaves* opposite or whorled, sometimes connate at the base, entire toothed lobed or pinnate; stipules 0. *Flowers* in cymes whorls or dense heads, surrounded by bracts, bracteoles often conspicuous. *Calyx*-tube adnate to the ovary, usually constricted above it; limb cup-shaped or bristly. *Corolla*-tube funnel-shaped; limb 2—5-fid, equal or 2-lipped, lobes imbricate in bud. *Stamens* 4 or 2, on the corolla-tube; anthers exserted, linear-oblong. *Ovary* 1-celled; ovule 1, pendulous; style filiform; stigma capitate linear or lateral; round the ovary an involucl, often adnate to it and persistent. *Fruit* a dry achene, enveloped in the involucl and surmounted by the calyx-limb. *Seed* pendulous, albuminous; embryo straight; radicle superior.

Dipsacus, Linn.

Stout erect herbs, prickly or bristly. *Leaves* opposite, toothed or pinnatifid. *Flowers* in long-peduncled terminal heads, surrounded by bracts; bracteoles rigid, on the receptacle. *Calyx*-limb cup-shaped, 4-lobed. *Corolla*-tube funnel-shaped; limb 4-lobed, equal or subbilabiate. *Stamens* 4. *Style* filiform; stigma oblique or lateral. *Achene* surrounded by the 8-ribbed involucl; cotyledons small, obtruse.

DIPSACUS LESCHENAUULTII, Coult.; F. B. I. iii. 218; Wt. III. 130; W. & A. 445.

W. Ghâts, Nilgiri and Pulney Hills, above 6,000 ft., on the downs.

A tall herbaceous plant with stout rootstock, villous pinnatifid leaves and white or yellowish flowers.

A specimen from Vantala in the Vizagapatam Hills, 4,500 ft., collected by A. W. Lushington, probably belongs to *D. inermis*, Wall.

Family LXXXVI. COMPOSITAE.

Herbs or shrubs, rarely trees. *Leaves* alternate or opposite, simple or compound; stipules 0. *Inflorescence* a centripetal head of many small flowers (less commonly few, rarely 1), sessile on the dilated top of the peduncle (receptacle), enclosed in an involucre of whorled bracts; bracteoles 0, or reduced to paleate scales or bristles on the receptacle. *Flowers* all tubular (discoïd), or the outer or all ligulate (rayed); all ♂, or the inner ♂ or ♂, the outer ♀ or neuter, sometimes monoecious or dioecious. *Calyx*-tube adnate to the ovary; limb 0 or of hairs or scales (pappus). *Corolla* of two forms: (i) tubular or campanulate with 4—5-lobed limb, the lobes valvate; (ii) ligulate, the lobes connate in a strap-shaped or elliptic ligule. *Disk* epigynous. *Stamens* 4—5, inserted within the corolla-tube; filaments usually free; anthers basifixed, usually connate, the connective produced upwards, the cells simple or

tailed at the base. *Ovary* 1-celled; ovule solitary, erect anatropous; style slender, normally 2-fid, the arms linear semi-terete, naked or pubescent, or tipped by pubescent cones, margins stigmatic. *Fruit* a dry indehiscent achene. *Seed* erect; testa membranous; albumen 0; cotyledons plano-convex; radicle short.

Series 1, TUBULIFLORAE.—Flowers all tubular or the outer only ligulate. Juice usually watery:—

Tribe 1. VERNONIEAE.—Heads homogamous. Flowers all ♂, tubular, never yellow. Anthers cleft at the base, not tailed. Style-arms subulate, hairy. Pappus setose paleaceous or 0. Leaves usually alternate:—

Heads distinct, usually many-flowered:—

Pappus short, fugacious; outer bracts more or less leafy:—

Achenes 8—10-ribbed.....1. *Centratherum*.

Achenes not ribbed.....2. *Lamprachaeum*.

Pappus 0; achenes 10-ribbed; outer bracts not leafy.....3. *Adenoon*.

Pappus long, copious, usually with an outer row of short bristles or paleae.....4. *Vernonia*.

Heads few-flowered, crowded in dense bracteate clusters.....5. *Elephantopus*.

Tribe 2. EUPATORIEAE.—Heads homogamous. Flowers all ♂, tubular, rarely orange, never yellow. Anthers subentire at the base. Style arms obtuse, papillose. Pappus usually setose. Leaves opposite or alternate:—

Anthers truncate at apex; pappus usually of 3 clavate hairs...6. *Adenostemma*.

Anthers appendaged at apex; pappus usually of 5 paleaceous scales.....7. *Ageratum*.

Tribe 3. ASTEREAE.—Heads heterogamous, rayed or discoid or homogamous and rayless. Flowers of disk usually yellow, of ray variously coloured. Anthers subentire at the base. Style-arms flattened or plano-convex. Pappus usually thinly setose. Leaves usually alternate:—

Heads not rayed:—

Achenes 4-angled; pappus 0; corollas yellow.....8. *Centipeda*.

Achenes compressed, the margin thickened; pappus 0 or in ♂ of 2 or 3 minute hairs; corolla of ♀ reddish, of ♂ yellow.....9. *Dichrocephala*.

Achenes minute, oblong, smooth; pappus 0; corollas rose-purple.....10. *Cyathocline*.

Achenes flattened, glandular; pappus tubular with fimbriate mouth; corollas yellow.....11. *Grangea*.

Heads rayed; disk flowers ♂, yellow:—

Ray flowers white:—

Pappus 0; achenes compressed, marginate; herbs.....12. *Myriactis*.

Pappus copious; achenes angled or ribbed; shrubs.....13. *Microglossa*.

Ray flowers white pink or purple, not yellow; pappus slender, often with a short outer ring; achenes compressed, marginate.....14. *Erigeron*.

Ray flowers yellow, filiform; pappus slender, usually reddish in fruit; achenes compressed.....15. *Conyza*.

Tribe 4. INULEAE.—Heads heterogamous, rayed or discoid or homogamous and rayless. Flowers of disk and rays usually yellow. Anther-bases tailed (except *Laggera*). Style-arms linear obtuse or styles of sterile flowers undivided. Leaves alternate:—

Heads heterogamous, not rayed:—

Heads corymbose or paniced:—

Herbs, often aromatic, with narrow bracts; pappus 1-seriate, caducous:—

Anther-bases tailed.....16. *Blumea*.

Anther-bases not tailed.....17. *Laggera*.

Shrubs or undershrubs with broad bracts; pappus 1-seriate, free or sometimes connate.....18. *Pluchea*.

Erect or diffuse herbs; pappus 0 or of 2—3 caducous hairs...19. *Epaptes*.

- Heads collected in dense globose or ovoid clusters:—
 Herbs with decurrent leaves; bracts paleaceous, few or many; pappus 0
 20. *Sphaeranthus*
 Shrubs with broad leaves; bracts 1—2, short; pappus in sterile flowers 0,
 in fertile flowers of short unequal bristles.....21. *Blepharispermum*.
 Heads corymbose or fascicled; bracts scarious, usually hyaline; more or
 less white- or yellow-woolly everlasting:—
 Flowers, ♂ usually sterile, ♀ in many rows fertile.....22. *Anaphalis*.
 Flowers, ♂ few fertile, ♀ in 2-many rows fertile.....23. *Gnaphalium*.
 Flowers, ♂ usually fertile, ♀ in 1, rarely 2 rows fertile.....24. *Helichrysum*.
 Heads solitary, terminal or axillary, drooping, large; outer bracts foliaceous;
 pappus 0.....25. *Carpesium*.
 Heads heterogamous, usually rayed:—
 Achenes terete, villous; pappus of ray flowers scanty or 0, of disk flowers
 of few slender hairs.....26. *Vicoa*.
 Achenes usually ribbed; pappus double, outer row of scales, inner of hairs
 27. *Pulicaria*
 Heads homogamous, not rayed, axillary, sessile with 2 large bracts; achenes
 flat, obovoid, winged; pappus of 2 ovate scales.....28. *Caesulia*.
Tribe 5. HELIANTHEAE.—Heads heterogamous, usually rayed or homoga-
 mous, not rayed. Flowers usually yellow. Receptacle paleaceous. Anther-bases
 not tailed. Style-arms truncate or appendiculate, or of sterile flowers entire.
 Pappus of 2—4 bristles or paleaceous or 0. Leaves usually opposite:—
 Heads monoecious; ♀ flowers all apetalous, ♂ many, in globular heads, the
 anthers free or nearly so; achenes 2 to each head, enclosed in a hardened
 spinous utricle; pappus 0; leaves alternate.....29. *Xanthium*.
 Heads heterogamous or homogamous; anthers united in a tube:—
 Heads 1-flowered, in clusters on a common receptacle supported by bracteate
 leaves; bracts 4—5, connate; achenes cuneate, compressed or 3-angled;
 pappus a toothed or fimbriate cup; lower or all leaves opposite...30. *Lagasca*.
 Heads many-flowered:—
 Flowers of ♀ ligulate, fertile, of ♂ sterile; leaves opposite:—
 Herbs or undershrubs; achenes obovoid, compressed, usually keeled at
 the margins; pappus 0 or of 2 minute hairs.....31. *Moonia*.
 Annual herbs; achenes spinous with 2 long horn-like spines at top
 32. *Acanthospermum*.
 Flowers of ♀ fertile, of ♂ fertile or the innermost sterile:—
 Pappus of 1—4 bristly awns or cup-like or 0:—
 Achenes all thick, or those of ♀ flowers 3-cornered and those of
 ♂ flowers compressed:—
 Inner bracts of involucre embracing the achenes of ♀ flowers, outer
 bracts 5, narrow, glandular; achenes glabrous, obovoid, angled;
 pappus 0.....32. *Siegesbeckia*.
 Inner bracts of involucre not embracing the achenes of ♀ flowers:—
 Paleae of receptacle flat, slender, plumose; outer bracts 5, broad,
 inner about 3; achenes of ♀ flowers triquetrous, warted, of
 ♂ flowers compressed; pappus of 1—2 minute teeth...33. *Eclipta*.
 Paleae of receptacle concave, embracing the achenes:—
 Ray flowers sterile, ligulate, yellow; achenes obovoid, curved,
 enclosed in the rugose or ribbed, often beaked paleae; pappus
 0 or a ring of scales.....34. *Sclerocarpus*.
 Ray flowers fertile:—
 Ligules small, yellowish or white; achenes truncate, not ciliate,
 of ♀ flowers triquetrous or compressed, of ♂ flowers 3—4-
 angled; pappus 0 or of 2—5 short bristles..... 35. *Blainvillea*.
 Ligules large, yellow; achenes truncate, cuneate, not ciliate,
 smooth or tubercled; pappus 0 or a ring of small scales
 36. *Wedelia*.
 Ligules small, white or yellow; achenes usually ciliate, of
 ♀ triquetrous or dorsally compressed, of ♂ laterally com-
 pressed; pappus 0 or of 2—3 bristles.....37. *Spilanthes*.

Achenes more or less depressed from the top; pappus of 2, rarely 3—4, bristles or 0:—

Outer bracts of involucre foliaceous, inner passing into paleae; ray flowers fertile:—

Achenes of ray flowers compressed, winged, the wings lacerate, of disk flowers compressed or triquetrous, often muricate; pappus of 2 slender awns.....38. *Synedrella*.

Achenes almost 4-cornered, glabrous, compressed, rounded at apex; pappus 0.....40. *Guizotia*.

Outer bracts of involucre few, small, inner connate below, membranous:—

Style-arms of disk flowers with a short appendage:—

Leaves alternate, pinnatisect; ray flowers fertile; achenes narrowly oblong, compressed, ciliate, bearded on the face; pappus of 2 smooth stiff awns.....39. *Glossocardia*.

Leaves opposite, simple to pinnatisect; ray flowers sterile; achenes linear or cuneiform; pappus of 2—4 persistent retrorsely barbellate awns.....40. *Bidens*.

Style-arms of disk flowers with a long hairy appendage; ray flowers fertile; achenes compressed, linear, ovoid or almost winged, with 2 retrorsely barbellate awns.....41. *Glossogyne*.

Pappus of numerous scales; heads rayed; leaves opposite; receptacle paleaceous:—

Heads very small; ligules white; pappus of ray flowers 0, of disk flowers with fimbriate scales.....42. *Galinsoga*.

Heads medium-sized; ligules yellow; pappus of aristate feathery bristles.....43. *Tridax*.

Tribe 6. HELENIEAE.—Heads heterogamous, rayed, or rarely homogamous, not rayed. Flowers usually yellow. Receptacle naked or slightly pitted. Anther-bases obtuse or rarely shortly sagittate, tips appendiculate. Style-arms truncate or appendiculate. Pappus paleaceous, aristate or 0. Leaves opposite or alternate:—

Heads very small, in dense cymes, surrounded by floral leaves; leaves opposite; achenes oblong, compressed, with 8—10 prominent ribs; pappus 0

44. *Flaveria*.

Tribe 7. ANTHEMIDEAE.—Heads heterogamous, rayed or discoid or homogamous and rayless. Flowers of various colours. Receptacle naked or paleaceous. Anther-bases not tailed. Style-arms truncate. Pappus 0 or a crown of short paleae. Flower-heads discoid, heterogamous; pappus 0. Leaves usually alternate:—

Small herbs, often creeping; heads solitary, on long peduncles.....45. *Cotula*.

Large herbs, usually erect and often shrubby; heads very small, in racemes or panicles.....46. *Artemisia*.

Tribe 8. SENECTIONEAE.—Heads heterogamous, rayed or discoid, or homogamous, not rayed. Disk flowers yellow or red; ray flowers also usually yellow. Receptacle usually naked. Anther-bases obtuse, rarely tailed. Leaves usually alternate:—

Style-arms truncate or appendiculate; pappus of fine hairs; heads homogamous, not rayed:—

Heads bracteolate at their bases; flowers yellow; style-arms with a long subulate hispid tip.....47. *Gynura*.

Heads without bracteoles at their bases; flowers purple or red; style-arms short and obtuse or long and acute.....48. *Emilia*.

Heads with or without bracteoles; flowers yellowish; style-arms short, papillose or hispid.....49. *Notonia*.

Heads heterogamous, rayed, rarely homogamous without rays; flowers usually yellow, bracteolate or not; style-arms usually truncate.....50. *Senecio*.

Tribe 9. CYNAREAE.—Heads homogamous or rarely heterogamous, with the outer ring of flowers neuter or ♀, all flowers tubular, variously coloured. Receptacle usually paleaceous or densely bristly. Anther-bases tailed. Styles

subentire or the arms short, hairy and thickened towards the base. Pappus paleaceous or bristly, rarely 0. Leaves alternate, often spinous:—

Heads 1-flowered, crowded in involucre spinous globose clusters...51. *Echinops*.

Heads many-flowered, separate:—

Basal areole of the achenes horizontal:—

Thistle with pinnatifid very spinous leaves; pappus hairs soft, feathery

52. *Cnicus*.

Erect branched annual with the leaves not spinous; pappus paleaceous

53. *Goniocaulon*

Basal areole of the achenes oblique or lateral:—

Involucre without leafy outer bracts at the base of the heads:—

Involucral bracts aristate-acuminate, usually recurved; achenes smooth, obscurely ribbed, with curved and hollowed large basal areoles; pappus of still short paleaceous scales or 0.....54. *Tricholepis*.

Involucral bracts, inner acute, outer spinescent; achenes angled and ribbed, pitted between the ribs, the basal areole small and lateral; pappus of many unequal bristles, the 2—4 inner ones long, dilated and flattened

55. *Volutarelia*.

Involucre with spinous outer leafy bracts; achenes large, smooth, angled; pappus 0.....*Carthamus*.

Tribe 10. MUTISIEAE.—Heads heterogamous or homogamous, rayed or not. Involucral bracts many-seriate, unarmed or spinescent. Receptacle rarely paleaceous. Anther-bases tailed. Style-arms rounded or truncate, not appendiculate. Pappus setose or paleaceous, rarely 0. Leaves usually alternate:—

Heads homogamous, with all the flowers ♂, or heterogamous with the outer flowers ♀; bracts rigid and spinescent; pappus hairs feathery; a low rigid white-tomentose undershrub.....56. *Dicoma*.

Series II. LIGULIFLORAE.—Flowers all ligulate. Juice milky:—

Tribe 11. CICHORIEAE.—Heads homogamous. Involucral bracts membranous, usually 1—2-seriate. Receptacle naked or paleaceous. Anther-bases sagittate, rarely tailed. Style-arms slender. Pappus setose paleaceous or 0. Leaves radical or alternate, never opposite:—

Pappus hairs feathery; achenes transversely barred between the ribs:—

Receptacle flat, naked; hispid leafy herbs with black hairs on the bracts; achenes narrow, pointed at both ends, not beaked.....57. *Picris*.

Receptacle paleaceous; glabrous scapigerous herbs with unequal bracts; achenes of two kinds, outer truncate, inner long-beaked.....58. *Hypochoeris*.

Pappus hairs simple:—

Achenes usually beaked, narrowed at the ends:—

Achenes fusiform or oblong, often slender, beaks short; corollas usually yellow.....59. *Crepis*.

Achenes compressed or flattened, glabrous or muriculate, the beak ending in a circular disk; corollas pink or bluish.....60. *Lactuca*.

Achenes angled and ribbed, long-beaked, minutely spinous below the beak; corollas yellow.....*Taraxacum*.

Achenes not beaked; pappus white, soft and silky:—

Achenes narrowed at the base, slightly contracted and truncate at apex; tall herbs with large pinnatifid leaves.....61. *Sonchus*.

Achenes truncate both at base and apex; low herbs with pinnatifid leaves and cylindric flower-heads.....62. *Launaea*.

1. *Centratherum*, Cass.

Erect or diffusely branched herbs. Leaves alternate, petioled, usually toothed. Heads homogamous, pedunculate, solitary or in corymbs. Involucre subhemispheric; bracts many-seriate, the outer herbaceous, often leafy, the inner scarious. Receptacle flat, naked or pitted. Corollas all tubular, equal, slender, purple; limb campanulate; lobes 5, narrow. Anthers obtusely auricled. Style-arms subulate,

puberulous. *Achenes* obtuse, 8—10-ribbed; pappus scanty or copious, usually short, fugacious.

Pappus yellowish:—

Stout perennial; leaves rugose above, white beneath, but prominently reticulate, the margins crenulate, recurved; flower-heads large, over 1 in. in diam., the outer bracts ovate, leafy, scabridly hirsute.....1. *reticulatum*.
Annuals; leaves beneath white-tomentose:—

Flower-heads up to .75 in. in diam., leaves more or less serrate, loosely white-felted, elliptic-ovate:—

Leaves deeply serrate; peduncles slender; outer bracts thickly white-felted, acute.....2. *molle*.

Leaves shortly serrate or entire; peduncles stout; outer bracts with coarse moniliform hairs, usually obtuse.....3. *courtallensis*.

Flower-heads scarcely .5 in. in diam.; leaves shortly crenulate, lanceolate, the under-surface closely felted except on the nerves; peduncles long, villous; outer bracts not white felted, but strigosely hirsute, acute.....4. *Rangacharii*.

Pappus reddish:—

Slender herbs:—

Pappus long, red, as long as, or longer than the corolla, exsert; outer bracts herbaceous, broad, cordate at base; leaves elliptic-lanceolate, serrate, completely white-woolly beneath.....5. *Ritchiei*.

Pappus short, pale, shorter than the corolla, included; outer bracts lanceolate, usually densely white-tomentose beneath, but rather variable; leaves elliptic, acute or acuminate, sharply serrate, white-tomentose beneath, but the nerves showing brown.....6. *phyllolaenum*.

Tall, stout herbs; inner pappus long, outer very short, rigid and paleaceous; outer bracts linear, green with purplish leafy obtuse tips; leaves long, lanceolate or ovate-lanceolate, coarsely serrate, membranous.....7. *anthelminticum*.

1. CENTRATHERUM RETICULATUM, Benth.; F. B. I. iii. 227. *Decaneuron reticulatum*, DC.; Wt. Ic. t. 1080 (not very good).

W. Gháts, open downs in the Nilgiris, Anamalais and Pulneys above 6,000 ft., common and conspicuous.

A handsome plant 2—3 ft. high, with the appearance of a *Centaurea*.

2. CENTRATHERUM MOLLE, Benth.; F. B. I. iii. 227. *Decaneuron molle*, DC.; Wt. Ic. t. 1082.

W. Gháts, hills of Tinnevely and Travancore, apparently in damp places at low levels.

3. CENTRATHERUM COURTALLENSE, Benth.; F. B. I. iii. 227. *Decaneuron courtallense*, DC.; Wt. Ic. t. 1081.

W. Gháts, Anamalais and hills of Travancore and Tinnevely at 5,000—7,000 ft.

4. CENTRATHERUM RANGACHARII, Gamble in Kew Bull. 1920, 338.

Hills of Tinnevely, apparently at 3,000—5,000 ft. (Rangachari, Barber).

5. CENTRATHERUM RITCHIEI, Hook. f.; F. B. I. iii. 228.

W. Coast, in S. Canara (?) (Beddome).

An annual herb with cordate outer bracts and long red pappus.

6. CENTRATHERUM PHYLLOLAENUM, Hook. f.; F. B. I. iii. 228.

W. Gháts, in S. Canara, Coorg, Mysore and Malabar at levels up to about 3,000 ft.

A very variable annual herb; even the pappus is only sometimes reddish.

7. CENTRATHERUM ANTHELMINTICUM, O. Kze. Rev. Gen. i. 320. *Veronica anthelmintica*, Willd.; F. B. I. iii. 236.

All Districts, often on roadsides, frequent on black cotton soil. A large erect annual with purplish flowers. The seeds are used as an anthelmintic and to destroy insects. Vern. *Hind.* Somraj.

2. *Lamprachaenium*, Benth.

An erect branched annual, hairs crisped. *Leaves* alternate, petioled, toothed, clothed below with white tomentum. *Heads* small, in sub-corymbose panicles, homogamous. *Involucre* subcampanulate; bracts many-seriate, dry, the inner chaffy, acute, the outer with recurved foliaceous tips, the margins hispid. *Receptacle* flat, naked. *Corollas* all tubular, equal, slender; limb shortly 5-fid. *Anthers* obtusely auricled. *Style-arms* subulate. *Achenes* obovoid, slightly compressed, shining, glabrous; pappus hairs few, short, red, fugacious.

LAMPRACHAENIUM MICROCEPHALUM, Benth.; F. B. I. iii. 229.

Mysore, in the Bababudan Hills, at 4,000—5,000 ft. (Law, Meebold).

An erect herb 1—2 ft. high with loose inflorescence, the leaves white-felted beneath, the flowers purple.

3. *Adenoon*, Dalz.

An erect, rigid, scabrous herb. *Leaves* alternate, sessile, coarsely and irregularly serrate, rough. *Heads* moderate-sized, in corymbose panicles, homogamous. *Involucre* campanulate; bracts many-seriate, imbricate, oblong-lanceolate, aristate, the outer gradually shorter. *Receptacle* flat, minutely fimbriate. *Corollas* all tubular, equal, very slender; limb 5-cleft with long linear lobes. *Anthers* dark-coloured, sagittate. *Style-arms* subulate, hairy. *Achenes* obovoid-cylindric, 10-ribbed, glandular between the ribs; pappus 0.

ADENOON INDICUM, Dalz.; F. B. I. iii. 229.

W. Ghâts, in S. Canara and Coorg; Brumagiri Hills of Mysore (Fischer); hills of Tinnevely (Beddome).

A rigid herb with broadly obovate serrate leaves and purple flowers.

4. *Vernonia*, Schreb.

Trees, shrubs, undershrubs, herbs or climbers. *Leaves* simple, alternate, entire or toothed. *Heads* homogamous, terminal or axillary, solitary or in cymes or panicles, usually corymbose. *Involucre* ovoid, globose or hemispheric; bracts many-seriate, the inner the longest. *Receptacle* naked or pitted, sometimes shortly hairy. *Corollas* all equal, tubular, slender; lobes 5, narrow. *Anthers* obtusely auricled at base. *Style-arms* subulate, puberulous. *Achenes* 10-ribbed 3—5-angled or terete; pappus usually 2-seriate, the outer simple or paleaceous, the inner long, feathery.

Trees; achenes 10-ribbed:—

Heads 1-flowered; leaf-margin entire, or rarely serrate:—

Leaves oblanceolate, glabrous above, scabrid-pubescent beneath, 6—10 in. long, main nerves about 10—12 pairs, 5—6 in. apart on midrib, irregularly reticulate between; ribs of achene not prominent.....1. *Shevaroyensis*.

Leaves obovate, pubescent on nerves above, densely brown tomentose beneath, 4—8 in. long, main nerves 10—15 pairs, .5—75 in. apart on midrib, with more or less regular transverse nervules; ribs of achene very prominent, with few hairs and glands between them.....2. *Monosis*.
 Heads 4—6-flowered; leaf-margin undulate, leaves obovate, obtuse, glabrous on both sides, 2—6 in. long, main nerves about 8 pairs; ribs of achene prominent with yellow glands between.....3. *travancorica*.

Shrubs or undershrubs:—

Achenes 10-ribbed, usually glandular between the ribs:—

Involucral bracts obtuse, mucronate:—

Leaves green beneath:—

Flower-heads small, slightly cottony, usually about 5-flowered, in small, short-peduncled corymbs at the ends of branches of a large panicle; leaves elliptic, acute, narrowed at base, distantly serrate, scabrid above, pubescent beneath, main nerves few, distant; pappus brownish.....4. *divergens*.

Flower-heads medium-sized, glabrous, usually 10—15-flowered in a large, usually long-peduncled terminal corymb; leaves elliptic-lanceolate, acuminate, narrowed at base, closely sharply serrate, nearly glabrous on both surfaces, main nerves many, close and parallel; pappus reddish.....5. *pectiniformis*.

Flower-heads medium-sized, very white-cottony, 12—15-flowered, in short few-capitulate terminal corymbs; leaves ovate, acute, narrowed at base, distantly shortly serrate, sparsely moniliform, hairy above, pubescent beneath, main nerves few, distant; pappus white.....6. *pulneyensis*.

Flower-heads large, slightly puberulous, 30—40-flowered, in 1—3-capitulate corymbs; leaves obovate or oblanceolate, obtuse and mucronate at apex, broadly amplexicaul and subauriculate at base, entire or nearly so, main nerves 2—3 pairs, indistinct; pappus reddish.....7. *Meeboldii*.

Leaves white beneath:—

Flower-heads about 12-flowered, the bracts puberulous, in terminal corymbs about 5 in. in diam.; leaves elliptic-lanceolate, up to 5 in. long, 3 in. broad, mucronate-serrate, glabrous above, closely appressed white-tomentose beneath, main nerves parallel, about 10 pairs; pappus reddish.....8. *Heynii*.

Flower-heads about 15-flowered, the bracts glabrous, in terminal slenderly peduncled corymbs about 3.5 in. in diam.; leaves lanceolate, acuminate at both ends, up to 4 in. long, 1.5 in. broad, minutely serrate, glabrous above, closely appressed white-tomentose beneath, main nerves about 7—10 pairs; pappus white.....9. *Fysoni*.

Flower-heads about 6—10-flowered, the bracts cottony-tomentose, in small corymbs in large terminal panicles or broad corymbs up to about 8 in. in diam.; leaves broadly ovate or suborbicular, dentate, glabrous above, softly white-tomentose beneath, main nerves about 8 pairs, much raised beneath; pappus yellowish.....10. *indica*.

Involucral bracts sharply acuminate, often aristate, the lowest usually subulate:—

Flower-heads small, .2—3 in. broad, in panicles of corymbs, the outer involucral bracts only reflexed-aristate; leaves elliptic-lanceolate, scabrous, crenate-serrate, main nerves 7—8 pairs, irregular; pappus reddish.....11. *saligna* var. *nilghirensis*.

Flower-heads large, .5 in. or more broad:—

Flower-heads in terminal corymbs, usually paniculate:—

Outer involucral bracts small, shortly aristate, reflexed, rest lanceolate; leaves oblanceolate or oblong-lanceolate, serrate, with scattered white hairs, up to 8 in. long, 2.5 in. broad, main nerves 7—11 pairs, distant; pappus pinkish; achenes long, hairy.....12. *Dalzelliana*.

Outer involucral bracts aristate, erect; leaves obovate, sharply serrate, scabrous, up to 5 in. long, 2 in. broad; main nerves regular, 8—10 pairs; pappus slightly reddish; branches straight.....13. *Roxburghii*.

Outer involucral bracts long-aristate, spreading; leaves elliptic-ovate or lanceolate, crenate, mucronate, rugose, reticulate, scabrous, up to 4 in. long, 2 in. broad, main nerves 6—7 pairs; pappus reddish; branches flexuous.....14. *peninsularis*.

Flower-heads 1 in. or more in diam., single or 1—3 together, often 1 pedunculate, 1 nearly sessile at the ends of the long branchlets; leaves lanceolate or linear-lanceolate, caudate-acuminate, coarsely serrate; pappus white; achenes villous.....15. *Beddomii*.

Achenes 3—5-angled:—

Outer pappus hairs setose, inner white, soft:—

Achenes 5-angled, silky, with white hairs; flower-heads .25 in. in diam., in corymbose panicles about 3 in. in diam.; leaves sessile, spatulate, obtuse at apex, ashy pubescent, nearly entire, .75—2 in. long.....16. *cinerascens*.

Achenes 4—5-angled, slightly hairy or glabrous, glandular; flower-heads .3 in. in diam., in corymbose panicles often 5 in. in diam.; leaves petioled, ovate-lanceolate, acuminate, serrate, rough and pubescent beneath, up to 3 in. long, 1 in. broad.....17. *setigera*.

Outer pappus hairs paleaceous:—

Leaves densely white-woolly beneath:—

Achenes trigonous:—

Heads very small, 5-flowered, .1—2 in. in diam., in close pedunculate corymbs, the involucre bracts short, cottony; achenes sharply angled, very glandular, the paleaceous scales fimbriate; leaves lanceolate, gradually narrowed above, minutely serrate, covered above (when young only) and below as well as on the branchlets with long, soft silky wool, up to 6 in. long, 1.5—2 in. broad.....18. *gossypina*.

Heads rather large, about .5 in. broad, about 15-flowered; the outer involucre bracts subulate, reflexed, inner obtuse, all white-cottony; achenes pyriform, glabrous, with strong ribs, the paleaceous scales fimbriate; pappus hairs stiff, few, deciduous; leaves linear-lanceolate, acute, crenulate, very rugose, covered below as well as the branches with closely appressed white hairs, up to 6 in. long, 1 in. broad.....19. *comorinensis*.

Achenes tetragonous:—

Heads small, 10—14-flowered, .25 in. in diam., the involucre bracts short, oblong, acute, cottony; achenes glabrous, smooth-sided, the paleaceous scales narrow; leaves sessile, linear-lanceolate, obtuse, crenulate, very rugose, covered below as well as the branches with soft silky wool, up to 6 in. long, 1 in. broad.....20. *salvifolia*.

Heads many-flowered, .5 in. in diam., the involucre bracts many, lanceolate acuminate, up to .4 in. long, slightly araneous; achenes almost winged, glabrous; leaves lanceolate, petioled, acuminate, closely crenulate, villous above, covered below like the branches with white wool, up to 8 in. long, 2.5 in. broad.....21. *multibracteata*.

Leaves more or less tawny-pubescent or tomentose beneath:—

Leaves beneath and branches with closely appressed golden pubescence, elliptic-lanceolate, acute, crenate-serrate, up to 3.5 in. long, 1.5 in. broad; flower-heads about .4 in. broad, in nearly sessile terminal corymbs, the involucre bracts ovate mucronate; achenes 5-angled, smooth, glandular, outer pappus very short.....22. *anamallica*.

Leaves beneath with soft tomentum:—

Tomentum thick, crispate, leaves elliptic or obovate, obtuse at apex, the margins subentire, up to 4.5 in. long, 2 in. broad; flower-heads small, 10—12-flowered, soft, in very large terminal corymbose panicles, often 10 in. in diam. and long-peduncled; achenes 3—5- usually 4-angled, puberulous and glandular; outer pappus short, subulate.....23. *Bourneana*.

Tomentum thin, leaves elliptic-lanceolate, acute at apex, serrulate, up to 4 in. long, 2 in. broad; flower-heads medium-sized, about 12-flowered, soft, in terminal corymbose panicles 4.5 in. in diam.; achenes 5-angled, glabrous, but with many white glands.....24. *malabarica*.

Tomentum thick, crispate; leaves oblanceolate, obtuse at apex; margins obscurely crenate, up to 2 in. long, .5 in. in diam.; flower-heads usually 1—4 only, about .5 in. in diam., many-flowered; achenes 4-angled, nearly glabrous but glandular.....25. *Bourdillonii*.

Leaves beneath only slightly pubescent when young, afterwards glabrous, linear-oblanceolate, subacute, obscurely serrate towards the apex, up to 2 in.

long. .25 in. broad; flower-heads .4 in. in diam., solitary or in pairs;
 achenes 4—5-angled, slightly pubescent and glandular; outer pappus fimbriate
 26. *Ramaswamii*.

Herbs or herbaceous undershrubs with achenes smooth or slightly 4—5-angular
 only and covered with appressed silky hairs:—

Annual or somewhat perennial herbs erect or decumbent, .5—1.5 ft. high, the
 leaves very variable, glabrous or pubescent, ovate or lanceolate, the margins
 undulately toothed; involucre bracts usually glabrous above; outer pappus
 hairs rather long.....27. *cinerea*.

Annual or perennial undershrubs, herbaceous:—

Stems and leaves very white-tomentose, thick, leaves ovate-rhomboid, crenate-
 dentate; outer pappus hairs short.....28. *albicans*.

Stems and leaves pubescent, thin, leaves often large, ovate-lanceolate, sharply
 serrate, prominently nerved; outer pappus hairs extremely short
 29. *conyzoides*.

1. *VERNONIA SHEVAROYENSIS*, Gamble in Kew Bull. 1920, 341.
 Carnatic, Shevaroy Hills of Salem (Perrottet).
 A small tree with rather thin nearly glabrous leaves.
2. *VERNONIA MONOSIS*, C. B. Clarke. *V. arborea*, var. *Wightiana*,
 Hook. f.; F. B. I. iii. 239. *Monosis Wightiana*, Wt. Ic. t. 1085;
 Bedd. Fl. t. 226.
 W. Gháts, from Coorg and the Bababudan Hills of Mysore
 to the Nilgiris, Anamalais and the hills of Travancore, usually
 above 4,000 ft., common in Nilgiri Sholas.
 A showy small tree with purple scented flowers and very tomen-
 tose leaves. Bark brown; wood pale brown, moderately hard,
 smooth and straight-grained. Vern. *Tam.* Shutthi; *Mal.*
 Kadavari.
3. *VERNONIA TRAVANCORICA*, Hook. f.; F. B. I. iii. 240. *V. volkame-
 riaefolia*, Bedd. Fl. t. 225, not of DC.
 W. Gháts, hills of Travancore and Tinnevely, in evergreen
 forests above 3,000 ft., often as standards over *Ochlandra*
 bamboo (Brandis).
 A small tree reaching 30 ft. in height. Vern. *Tam.* Thenpu.
4. *VERNONIA DIVERGENS*, Edgew.; F. B. I. iii. 234. *V. nilgheryensis*,
 DC.; Wt. Ic. t. 1078. *Decaneurum divergens*, Wt. Ic. t. 1084.
 E. Gháts, hills from Ganjam to Godavari, up to 4,500 ft.; hill
 forests of the Deccan; W. Gháts, common in dry forest areas
 up to 6,000 ft.
 A tall handsome shrub reaching 4—5 ft., with pink flowers and
 small capitula, rather variable in hairiness according to climate.
5. *VERNONIA PECTINIFORMIS*, DC.; F. B. I. iii. 239; Wt. Ic. t. 1077.
 W. Gháts, Nilgiri Hills above 6,000 ft. on the margins of Sholas.
 An erect or sometimes semiscandent shrub with purple flowers.
6. *VERNONIA PULNEYENSIS*, Gamble in Kew Bull. 1920, 341.
 W. Gháts, Kodaikanal in Pulney Hills at 7,000 ft. (Fyson).
 A slender undershrub.
7. *VERNONIA MEEBOLDII*, W. W. Smith in Rec. Bot. Surv. Ind. iv. 283.
 Travancore (Meebold)—from description only.
 An erect undershrub.
8. *VERNONIA HEYNI*, Bedd. MS. in Herb. Madr. ex Gamble in Kew
 Bull. 1920, 340.

- Hills of Travancore (Beddome).
Apparently an erect shrub.
9. *VERNONIA* *FYSONI*, Calder in Rec. Bot. Surv. Ind. vi. 343, t. 10.
Pulney Hills, in Shola Forest at about 6,000—7,000 ft. (Bourne, Fyson).
An erect undershrub, up to about 10 ft. high.
 10. *VERNONIA* *INDICA*, C. B. Clarke; F. B. I. iii. 238.
W. Gháts, from S. Canara and Coorg southwards to the hills of Travancore at 4,000—6,000 ft.
A large erect undershrub, conspicuously white-tomentose on the branches, inflorescence and leaves beneath, the pappus yellowish, the flowers reddish-purple.
 11. *VERNONIA* *SALIGNA*, DC.; F. B. I. iii. 235.
Var. *nilghirensis*, Hook. f.
W. Gháts, Nilgiri Hills and Wynaad.
An erect undershrub.
 12. *VERNONIA* *DALZELLANA*, Drumm. & Hutch. in Kew Bull. 1909, 261.
W. Gháts, S. Canara, Coorg and Mysore at 2,000—3,000 ft.
An erect or subscandent undershrub up to 4 ft. high, the rather large leaves membranous.
 13. *VERNONIA* *ROXBURGHII*, Less.; F. B. I. iii. 232.
N. Circars, Sal forests of Ganjam (Gamble).
A large erect scabrous undershrub with reddish flowers, the achenes with stiff hairs, the flower-heads large, many-flowered.
 14. *VERNONIA* *PENINSULARIS*, C. B. Clarke; F. B. I. iii. 233. *Decaneuron silhetense*, DC.; Wt. Ic. t. 1083.
W. Gháts, Anamalais, Pulneys and hills of Travancore, above 6,000 ft.
An erect undershrub with flexuous branches, reddish flowers and heads with recurved arisate lower bracts.
 15. *VERNONIA* *BEDDOMEI*, Hook. f.; F. B. I. iii. 231.
W. Gháts, hills of S. Travancore at low elevations.
A straggling undershrub with long slender branches with distant leaves and large reddish-purple flowers.
 16. *VERNONIA* *CINERASCENS*, Schultz-Bip.; F. B. I. iii. 237.
S. Deccan, in dry plains regions of Coimbatore (Fischer).
An erect shrub, reaching 3 ft. in height.
 17. *VERNONIA* *SETIGERA*, Arn.; F. B. I. iii. 235.
W. Gháts, hills of Tinnevelly, about 4,000 ft.
An erect undershrub.
 18. *VERNONIA* *GOSSYPINA*, Gamble in Kew Bull. 1920, 340.
Hills of Tinnevelly between Sengalteri and Naterikal, about 3,000—5,000 ft. (Rangachari).
A very handsome undershrub with pink corollas and beautiful long silky wool on the branchlets and undersides of the leaves.
 19. *VERNONIA* *COMORINENSIS*, W. W. Smith in Rec. Bot. Surv. Ind. iv. 283.
Hills of Tinnevelly and Travancore about 3,000—5,000 ft. (Beddome, Rangachari).
A small tree (Beddome), but apparently a handsome shrub.

20. *VERNONIA SALVIFOLIA*, Wt. Ic. t. 1079; F. B. I. iii. 237.
Hills of Tinnevely and Travancore at about 4,000—6,000 ft.
A handsome shrub with thick branches.
21. *VERNONIA MULTIBRACTEATA*, Gamble, in Kew Bull. 1920, 341.
Travancore Hills, at Peermard, 3,000 ft. (Beddome).
Apparently a shrub.
22. *VERNONIA ANAMALLICA*, Bedd. in Herb. Madr. ex Gamble in Kew Bull. 1920, 339.
Anamalai Hills, in the higher ranges (Beddome).
Apparently an erect shrub, golden brown when dry.
23. *VERNONIA BOURNEANA*, W. W. Sm. in Rec. Bot. Surv. Ind. vi. 101.
Pulney Hills and hills of Travancore, at 4,000—7,000 ft.
A shrub or undershrub.
24. *VERNONIA MALABARICA*, Hook. f.; F. B. I. iii. 230. *V. bababudensis*, Talbot in Journ. Bomb. Nat. Hist. Soc. xi. 237, t. 8. *V. Candolleana*, W. & A.; F. B. I. iii. 236?
Bababudan Hills of Mysore at 5,000—6,000 ft. (Talbot); Sispara Ghât in Nilgiris (Beddome); hills of Travancore at 4,500 ft. (Meebold).
A stout shrub.
25. *VERNONIA BOURDILLONII*, Gamble in Kew Bull. 1920, 339.
Travancore, in grass lands at high elevations over 4,000 ft. (Bourdillon, Rama Row).
A common (Bourdillon) shrub reaching 3 ft. in height with purple flowers.
26. *VERNONIA RAMASWAMII*, Hutch. in Kew Bull. 1916, 35.
W. Ghâts, hills of Tinnevely and Travancore, on the banks of streams and in the beds of rivers about 3,000—4,000 ft.
Apparently a small undershrub.
27. *VERNONIA CINEREA*, Less.; F. B. I. iii. 233 *in part*.
All plains Districts and to some altitude in the hills, a very common roadside or open forest or garden weed.
A herbaceous plant with pink or lilac flowers and white silky pappus, the involucral bracts oblong-lanceolate, acuminate, the leaves very variable.
28. *VERNONIA ALBICANS*, DC.; C. B. Clarke, Comp. Ind. 22. *V. cinerea*, Less., *in part*, F. B. I. iii. 233.
Hills of the Deccan, Carnatic and E. side of W. Ghâts, up to 4,000 ft. in open forest.
A very white tomentose undershrub.
29. *VERNONIA CONYZOIDES*, Wt. Ic. t. 1076, *except the achenes*; C. B. Clarke, Comp. Ind. 21. *V. cinerea*, Less.; F. B. I. iii. 233 *in part*.
W. Ghâts, Nilgiris, Pulneys and southwards at high levels above 6,000 feet in Shola forests.
An erect herbaceous undershrub, sometimes reaching to 6 ft. in height, flowers purplish.

5. *Elephantopus*, Linn.

Rigid, usually perennial herbs. *Leaves* alternate or radical, entire or toothed. Heads homogamous, of 2—5 flowers, collected in a head-

like cluster supported by 3 broadly ovate-cordate leafy bracts; bracts of the heads about 8, in 2 rows, the outer shorter, all stramineous, oblong, acute. *Receptacle* naked. *Corollas* equal, tubular; limb deeply cleft in 5 lobes, which often spread palmately. *Anthers* auricled at base. *Style-arms* subulate, puberulous. *Achenes* 10-ribbed, truncate at apex; pappus bristles rigid, slender throughout or dilated below in a chaffy base.

ELEPHANTOPUS SCABER, Linn.; F. B. I. iii. 242; Wt. Ic. t. 1086.

Forest undergrowth in all Districts, especially dry.

A stiff subscapigerous herb with obovate-oblong basal leaves up to 8 in. long, narrow sessile cauline ones, stiff heads with purple flowers and a pappus of 4—6 bristles dilated at base. Vern. *Hind.* Sandulun; *Tam.* Anashovadi.

6. *Adenostemma*, Forst.

Herbs, glabrous or glandular-pubescent and sticky. *Leaves* usually opposite, petiolate, variously toothed. *Heads* homogamous, in terminal corymbs. *Involucre* campanulate; bracts many, equal, in 2 rows, herbaceous, sometimes connate. *Receptacle* flat, pitted. *Corollas* all equal, tubular, regular; limb 5-toothed. *Anthers* truncate with a glandular tip and obtuse base. *Style-arms* large and long, clavate. *Achenes* compressed, truncate, 3—5-angled, papillose when young, afterwards often glabrous; pappus of 3 or more short clavate hairs on a short ring.

ADENOSTEMMA LAVENIA, O. Kze., Rev. Gen. i. 304. *A. viscosum*, Forst.; F. B. I. iii. 242. *A. latifolium*, DC.; Wt. Ic. t. 1087.

W. Coast and W. Ghâts, at all levels, in damp forests and along streams; Shevaroy Hills of Salem; forests of Cuddapah (Bed-dome).

An erect sticky herb reaching 3 ft. in height, with white flowers, trigonous achenes, 3 pappus hairs and very variable leaves, usually thin but sometimes rugose, usually broadly ovate, crenate serrate or dentate on the margins, in one form linear-oblong.

7. *Ageratum*, Linn.

Erect herbs or undershrubs, strong-scented. *Leaves* opposite or the upper alternate. *Heads* homogamous, in dense corymbs or panicles. *Involucre* campanulate; bracts 2—3-seriate, linear, subequal. *Receptacle* nearly flat, naked or with caducous scales. *Corollas* all tubular, equal, regular, 5-cleft. *Anthers* appendaged, bases obtuse. *Style-arms* elongate, obtuse. *Achenes* 5-angled, glabrous or the angles slightly hispid; pappus of 5 free or connate paleaceous scales, broad and laccrate towards the base, aristate at apex or of 10—20 narrow unequal scales.

AGERATUM CONYZOIDES, Linn.; F. B. I. iii. 243.

Most districts, both in the plains and hills, usually in damp places and in forest undergrowth; abundant and often troublesome in tea, coffee and other plantations.

A softly hairy annual weed with pale blue flowers, ovate crenate perioled leaves and black achenes.

8. *Centipeda*, Lour.

Annual or perennial herbs. *Leaves* alternate, entire or toothed. *Heads* small, heterogamous, not rayed, sessile on the branches or racemose, yellow; outer flowers ♀, many-seriate, inner ♂, fewer, all fertile. *Involucre* hemispheric, bracts 2-seriate, spreading in fruit, small. *Receptacle* flat, naked. *Corollas* of ♀ flowers minute, obscurely lobed, of ♂ flowers with short tube and campanulate limb, 4–5-lobed. *Anther-bases* obtuse. *Style-arms* short, truncate. *Achenes* 4-angled, obtuse at tip, the angles hairy, often glandular between; pappus 0.

CENTIPEDA ORBICULARIS, Lour.; F. B. I. iii. 317. *Dichrocephala Schmidii*, Wt. Ic. t. 1610.

All Districts, in wet places.

A diffuse often prostrate small herb having obovate leaves with few teeth, the flower-heads sessile.

9. *Dichrocephala*, DC.

Annual herbs. *Leaves* alternate, lyrate or pinnatifid, toothed. *Heads* heterogamous, not rayed, very small, globose or hemispheric, in terminal or axillary panicles; outer flowers ♀, fertile, many-seriate, inner ♂, fertile, fewer. *Involucre* small; bracts sub-biseriate, slightly unequal. *Receptacle* somewhat contracted within the margin, elevated, the top flat. *Corollas* short of ♀ flowers slender, minutely 2–3-toothed or expanded in a 3–4-lobed limb, reddish; of ♂ flowers with a campanulate 3–4-lobed limb, yellow. *Anthers* short, the bases truncate. *Style-arms* short, flattened. *Achenes* compressed, with a thickened margin; pappus 0 or in ♂ flowers of 2–3 minute hairs.

Heads .1 in. in diam.; corolla of ♀ flowers narrowly tubular, curved, scarcely toothed; leaves petioled, very variable, usually obovate in outline, pinnatifid, with a large terminal lobe and smaller lateral ones; crenate-serrate, up to 5 in. long, 2 in. wide, sparsely hairy.....1. *latifolia*.
Heads .2 in. in diam.; corolla of ♀ flowers shortly tubular below, expanding above with 3–4 lobes; leaves sessile, auricled at base, obovate or oblong, pinnatifid, coarsely serrate, up to about 2 in. long, .5 in. wide, hispid-pubescent

2. *chrysanthemifolia*.

1. *DICHROCEPHALA LATIFOLIA*, DC.; F. B. I. iii. 245; Wt. Ic. t. 1096.
N. Circars, Hills of Vizagapatam above 3,000 ft.; Deccan, in N. Coimbatore Hills; W. Ghâts, in all Districts and up to 8,000 ft.
2. *DICHROCEPHALA CHRYSANTHEMIFOLIA*, D.C.; F. B. I. iii. 245; Wt. Ic. t. 1095.
W. Ghâts, Nilgiri and Pulney Hills, above 6,000 ft., on open downs.

10. *Cyathocline*, Cass.

Erect, annual scented herbs. *Leaves* alternate, pinnatisect. *Heads* heterogamous, small, in terminal panicles, not rayed; outer flowers ♀, fertile, many-seriate; inner ♂, usually sterile. *Involucre* hemispheric; bracts sub-biseriate, lanceolate, acute, with scarious margins. *Receptacle* elevated, with contracted base and naked concave top. *Corollas* of ♀ flowers filiform with 2-toothed limb; of ♂ tubular with campanulate 5-lobed limb. *Anthers* appendaged at tip, bases truncate. *Style-arms*

inserted, short, in ♂ flowers sometimes simple. *Achenes* minute, oblong, smooth; pappus 0.

CYATHOCLINE LYRATA, Cass.; F. B. I. iii. 246; Wt. Ic. t. 1098.

Hills of N. Circars and Deccan, in moist places and on banks of streams; W. Gháts, down to Nilgiris, at low levels, in wet places and ricefields.

A very pretty sweet-scented herb with rose-purple flowers and very much cut leaves.

11. Grangea, Forsk.

Herbs, suberect or prostrate, villous. *Leaves* alternate, pinnatifid. *Heads* heterogamous, not rayed, terminal or leaf-opposed, subglobose; outer flowers ♀, fertile, 1-or many-seriate; inner ♂, fertile. *Involucre* broadly campanulate; bracts few-seriate, the outer herbaceous. *Receptacle* convex or conical, naked. *Corollas* of ♀ flowers filiform, the outer 2-, the inner 2—4-cleft; of ♂ flowers with slender tube and campanulate 4—5-lobed limb. *Anthers* produced at apex, obtuse at base. *Style-arms* in ♀ short, in ♂ flattened, obtuse or with triangular points. *Achenes* flattened, glandular; pappus tubular with a fimbriate mouth.

GRANGEA MADERASPATANA, Poir.; F. B. I. iii. 247; Wt. Ic. t. 1097.

All plains Districts; a common weed usually growing prostrate on the ground on sandy lands and in waste places.

Flowers yellow, leaves sinuately pinnatifid with opposite lobes, the pappus-tube characteristic.

12. Myriactis, Less.

Erect annual herbs. *Leaves* alternate, dentate. *Heads* heterogamous, rayed, the ray flowers white, those of the disk yellow, solitary or in loose panicles; outer flowers ♀, fertile, 2- many-seriate; disk flowers ♂, often sterile. *Involucre* hemispheric; bracts few-seriate, narrow, the margins scarious. *Receptacle* broad, convex, naked. *Corollas* of ♀ flowers with short tube, the ligule spreading or revolute in a curl, those of ♂ flowers with a short tube and campanulate 4—5-lobed limb. *Anthers* obtuse at base. *Style-arms* of ♀ short, of ♂ lanceolate, flattened. *Achenes* compressed, marginate, shortly beaked; pappus 0.

MYRIACTIS WIGHTII, DC.; F. B. I. iii. 247; Wt. Ic. t. 1091.

W. Gháts, Nilgiris and Pulney Hills at 7,000 ft. and higher.

A stiff, annual weed with ovate or lyrate dentate villous leaves decurrent on a rather long petiole, long-peduncled heads and white-rayed flowers.

Var. *bellidioides*, Hook. f., leaves mostly radical, spatulate; heads scape-like, solitary.

Nilgiris, above Sispara, at 6,000—7,000 ft.

13. Microglossa, DC.

Shrubs, sometimes climbing. *Leaves* alternate, entire or denticulate-serrate, petioled. *Heads* heterogamous, rayed, in corymbs often paniculate; ray flowers ♀ in 1—many-rows, fertile; disk flowers ♂,

few or many, often sterile. *Involucre* campanulate; bracts narrow, the margins usually scarious, the outer short. *Receptacle* flat, naked or slightly fimbriate. *Corollas* of ligulate flowers with narrow tube and bifid whitish ligule; of disk flowers tubular with campanulate limb and 5 spreading lobes. *Anther*-bases obtuse. *Style*-arms in ♀ slender, in ♂ lanceolate, flattened. *Achenes* angular or ribbed, hairy, more or less compressed; pappus hairs 1—2-seriate, rather unequal.

MICROGLOSSA ZEYLANICA, Benth.; F. B. I. iii. 257.

W. Gháts, Pulney Hills (Wight).

An erect branching shrub.

Var. *Beddomei*, Gamble. Leaves sessile or nearly so, narrower and more prominently nerved, broadest near the base; flowers, both ♀ and ♂, more numerous.

W. Gháts, hills of Travancore (Beddome); Sengalteri in Tinnevely (Madras Coll.).

14. *Erigeron*, Linn.

Annual or perennial herbs. *Leaves* alternate, usually radical and cauline, entire or toothed. *Heads* heterogamous, rayed, the outer ligulate flowers in few series ♀., then usually many filiform ♂ without ligules; disk flowers ♂, all usually fertile. *Involucre* hemispheric or campanulate; bracts sub-biseriate, narrow, numerous. *Receptacle* flat or slightly convex, naked or pitted. *Corollas* of ligulate flowers narrow, white, pink or purple, of interior ♀ flowers merely filiform, of ♂ flowers yellow, tubular, with campanulate 5-lobed limb. *Anther*-bases obtuse. *Style*-arms of ♀ flowers linear, of ♂ flowers lanceolate, flattened. *Achenes* compressed, marginate, narrow, usually minutely villous; pappus slender, feathery, often with a short outer ring.

Heads very small, under .25 in. in diam., in elongate branched many-flowered panicles; leaves narrowly linear or lanceolate, entire or slightly toothed

1. *canadensis*.

Heads more than .25 in. in diam., in few-flowered terminal corymbs:—

Leaves obovate, coarsely toothed, amplexicaul at base, softly villous pappus white

2. *asteroides*.

Leaves oblong-lanceolate, entire or slightly toothed, the radical spatulate, decurrent on a long petiole; pappus reddish.....3. *alpinus* var. *Wightii*.

1. *ERIGERON CANADENSIS*, Linn.; F. B. I. iii. 254.

W. Gháts, Nilgiris, at 6,000 ft., believed to have spread from N. America.

A tall herb, reaching 3 ft. in height, the small ligules pale rose-coloured.

2. *ERIGERON ASTEROIDES*, Roxb.; F. B. I. iii. 254.

Plains Districts of the Circars, Deccan and Carnatic, less common on W. Coast, up to about 3,000 ft.

A coarse villous herb with bluish ligules and yellow disk flowers, the pappus a dirty white.

3. *ERIGERON ALPINUS*, Linn.; F. B. I. iii. 255.

Var. *Wightii*, Hook. f. *E. Wightii*, DC.; Wt. Ic. t. 1090.

W. Gháts, Nilgiris, above 6,000 ft., on the downs.

An erect hispid herb with pale purple ligules, the disk flowers yellow.

E. mucronatus, DC., a Mexican plant, is cultivated and has run wild in the Nilgiri Hills, where it has been known locally as *Vittadenia australis*, A. Rich. (cf. Fyson Hillt. Fl. 223).

15. *Conyza*, Less.

Annual or perennial herbs. *Leaves* alternate, entire or variously lobed. *Heads* heterogamous, not rayed, in corymbs or panicles, rarely solitary, the outer flowers ♀, many-seriate, fertile, inner ♂, fertile or sterile. *Involucre* campanulate; bracts 2-many-seriate, narrow, the outermost smallest. *Receptacle* flat or convex, naked or pitted and fimbriate. *Corollas* of ♀ flowers filiform, short, yellow, of ♂ flowers tubular, with slightly enlarged 5-lobed limb, yellow. *Anther*-bases obtuse. *Style*-arms of ♀ slender, of ♂ flattened, lanceolate. *Achenes* small, compressed; pappus slender, 1- or rarely 2-seriate, usually reddish in fruit.

Flower-heads rather large, .25 in. or more broad:—

Heads in corymbs:—

Corymbs terminal or from upper axils, close:—

Leaves obovate or oblong, radical spatulate, coarsely but regularly serrate; heads .3 in. broad; achenes with few scattered hairs or glabrous

1. *japonica*.

Leaves lanceolate or obovate-lanceolate, irregularly and pinnatifidly lobed; heads .5 in. broad; achenes villous.....2. *aegyptiaca*.

Corymbs terminal on most branchlets, loose; leaves lanceolate, entire or serrate, narrowed at both ends, viscid; heads .3 in. broad; achenes minutely villous

3. *viscidula*.

Heads in racemose panicles, usually loose, about .4 in. broad; leaves long, linear, entire or sometimes remotely serrate, hispidly villous; achenes sparsely silky

4. *ambigua*.

Flower-heads very small, about .1 in. broad, in rounded terminal corymbs; leaves narrowly linear to obovate-spatulate, entire or serrate, crispate-pubescent, fastigately arranged on the stems; achenes puberulous.....5. *stricta*.

1. *CONYZA JAPONICA*, Less.; F. B. I. iii. 238.

N. Circars, Mahendragiri Hill at 4,000 ft.; W. Gháts, Nilgiri and Pulney Hills, above 5,000 ft.

2. *CONYZA AEGYPTIACA*, Ait.; F. B. I. iii. 258.

Deccan, in Mysore and Coimbatore to the N. slopes of the Nilgiris at 5,000 ft., in dry places.

3. *CONYZA VISCIDULA*, Wall.; F. B. I. iii. 258.

W. Gháts, on western side from Wynaad to Tinnevely, at 3,000—4,000 ft.

A tall much-branched viscid herb.

4. *CONYZA AMBIGUA*, DC. Fl. Fr. vi. 468. *Erigeron linifolius*, Willd.; F. B. I. iii. 234.

Deccan, in N. Arcot (Rangachari); W. Gháts, Nilgiri and Pulney Hills, often on roadsides, above 6,000 ft.

An erect soft villous herb with yellow flowers, said (in F. B. I.) to be an "escape", i.e. an introduced plant.

5. *CONYZA STRICTA*, Willd.; F. B. I. iii. 258.

N. Circars, Mahendragiri Hill, at 4,500 ft.; hills of the Deccan and Carnatic; W. Gháts, Nilgiris, Pulneys and hills of Travancore, above 4,000 ft.

An erect plant with very small yellowish flower-heads.

16. *Blumea*, DC.

Herbs or undershrubs, occasionally shrubs, annual or perennial, glandular-pubescent, woolly or glabrous, usually aromatic. *Leaves* alternate, usually toothed or lobed. *Heads* heterogamous, not rayed, in corymbs panicles or fascicles, rarely racemed or solitary, the outer flowers ♀, many-seriate, the inner ♂, few, fertile. *Involucre* campanulate; bracts many-seriate, narrow, herbaceous or soft, the outer smaller. *Receptacle* flat, naked, sometimes pubescent. *Corollas* of ♀ flowers filiform, minutely 2—3-toothed; of ♂ flowers tubular, slender, with a slightly enlarged 5-lobed limb. *Anther*-bases sagittate with small slender tails. *Style*-arms of ♀ slender, of ♂ flattened, papillose. *Achenes* small, terete or angled or ribbed; pappus 1-seriate, the hairs slender, caducous.

Herbs. Heads solitary or 2. peduncled at the ends of the branchlets; lobes of ♂ corollas villous:—

Inner involucre bracts long-hair-tipped; leaves all alternate, semi-amplexicaul, dentate or entire; achenes oblong, not angled or ribbed, pubescent; pappus pink 1. *amplectens*.

Inner involucre bracts acuminate, not long-hair-tipped; leaves alternate, but the 2 uppermost subopposite, sessile but not amplexicaul, serrate; achenes oblong, angled, pubescent; pappus white.....2. *bifoliata*.

Heads few, in axillary and terminal corymbs:—

Prostrate herb with branches radiating from the rootstock; leaves membranous, obovate, sharply dentate, the young ones silky; corolla-lobes of ♂ flowers villous; achenes 4-angled.....3. *oxyodonta*.

Erect herbs:—

Heads 3 in. broad or less, long-peduncled; leaves membranous, sessile or nearly so, sharply dentate, the teeth alternately long and short, the young ones silky; corolla-lobes of ♂ flowers pubescent; achenes angled, sparsely hairy.....4. *eriantha*.

Heads 3 in. broad, sessile; leaves rather thick, ovate or obovate, densely white-silky beneath, irregularly dentate; corolla-lobes of ♂ flowers pubescent in bud, afterwards glabrous; achenes terete, nearly glabrous.....5. *Belangeriana*.

Heads 5 in. or more broad, densely silky, peduncled; leaves leathery, sessile, obovate, closely jaggedly dentate, densely white-silky on both sides; corolla-lobes silky pubescent, also tube; achenes flattened, hairy.....6. *Malcolmii*.

Heads many:—

Heads in close spiciform cymes or panicles, usually small:—

Corollas of ♂ purple; leaves obovate:—

Leaves irregularly toothed; corolla-lobes glandular; achenes hairy

7. *Wightiana*.

Leaves regularly gland-toothed; corolla-lobes glabrous or slightly hairy; achenes glabrous or nearly so.....8. *neilgherrensis*.

Corollas of ♂ yellow:—

Heads sessile in distinct fascicles on long nearly leafless spikes; involucre bracts usually red or purple; corolla-lobes slightly hairy; leaves oblanceolate, coarsely toothed, sometimes pinnatifid; achenes 4-angled and ribbed, sparsely hairy.....9. *glomerata*.

Heads in peduncled clusters both terminal and axillary:—

Leaves small, 1—2 in. long, densely white-silky beneath, obovate or oblanceolate, coarsely toothed; heads with slender peduncles; corolla-lobes glandular; achenes ribbed, hairy.....10. *barbata*.

Leaves large, up to 5 in. long, not silky and nearly glabrous beneath, obovate or lyrate, coarsely toothed, with rather few sharp teeth; corolla-lobes glabrous; achenes not ribbed, subtrigonous.....11. *lacera*.

Heads in close clusters terminal to the stem or its branches, the stem scape-like, the clusters with much silky wool underneath them; basal leaves in rosette, oblanceolate or spatulate, regularly shortly dentate, stem-leaves

usually smaller and more oblong, often very white-woolly; corolla-lobes glabrous but glandular; achenes ribbed, pubescent at first, then glabrous

12. *hieracifolia*.

Heads small, in spreading corymbs and panicles; corollas of ♂ yellow; achenes ribbed:—

Lower leaves runcinate lyrate or subpinnatifid:—

Stem tall, slender, much-branched, glabrous, as are the leaves; lower leaves lyrate or runcinate, irregularly toothed, upper oblong, all membranous and green; heads small, on slender peduncles; corolla-lobes glandular; receptacle glabrous.....13. *virens*.

Stem and leaves pubescent or villous:—

Receptacle glabrous; heads in open panicles; leaves obovate or oblanceolate, coarsely toothed, the upper small, minutely pubescent

14. *membranacea*.

Receptacle minutely pubescent; heads in corymbs often congested; leaves variable, obovate spatulate, often very pinnatifid, villous.....15. *laciniata*.

Lower leaves obovate or oblanceolate, irregularly toothed, decurrent; heads in much divaricating branched corymbs, the peduncles glandular; achenes very silky-pubescent.....16. *Jacquemontii*.

Heads large:—

Tall herbs, with heads in axillary sessile or peduncled clusters; leaves lanceolate-oblong distantly serrate, subsessile; receptacle pubescent; achenes ribbed

17. *malabarica*.

Stout herbs with heads in clusters at the ends of the many branches; leaves elliptic-lanceolate, acuminate, irregularly toothed; achenes angled and ribbed

18. *flexuosa*.

Shrub or undershrub reaching 6 ft. high, the heads in a large pyramidal panicle; leaves lanceolate or oblanceolate, 6—10 in. long, shortly serrate, long petioled; achenes ribbed, softly hairy.....19. *spectabilis*.

1. *BLUMEA AMPLECTENS*, DC.; F. B. I. iii. 260.
Deccan and Carnatic, in dry Districts, frequent near the sea on the E. coast.
A small annual herb with yellow flowers, the coast form often glabrous.
2. *BLUMEA BIFOLIATA*, DC.; F. B. I. iii. 261.
N. Circars, Deccan and Carnatic, in dry places.
A bushy herb up to 2 ft. high with yellow flowers.
3. *BLUMEA OXYDONTA*, DC.; F. B. I. iii. 266.
Most Districts, not very common.
A prostrate herb with large basal leaves and long branches with small ones.
4. *BLUMEA ERIANTHA*, DC.; F. B. I. iii. 266.
Locality not recorded, probably W. Coast (Wight).
A slender erect herb with peduncled heads in dichotomous corymbose cymes.
5. *BLUMEA BELANGERIANA*, DC.; F. B. I. iii. 266.
W. Ghats, in all Districts from S. Canara southwards, up to about 3,000 ft.
An erect herb with reddish-brown stems and silky flowers and leaves, the heads sessile in the leaf-axils.
6. *BLUMEA MALCOLMII*, Hook. f.; F. B. I. iii. 266.
Locality not recorded, probably S. Canara and Malabar (Wight).
A stout herb with rather large thick leaves, which, with the inflorescence, are covered with soft white silky wool, the flowers yellow.

7. *BLUMEA WIGHTIANA*, DC. ; F. B. I. iii. 261.
All Districts and up to 4,000 ft. in hilly country, common.
An erect strong-smelling herb.
8. *BLUMEA NEILGHERRENSIS*, Hook. f. ; F. B. I. iii. 261.
W. Gháts, Nilgiri and Pulney Hills, southwards to those of
Tinnevely, above 5,000 ft.
An erect herb, very softly hairy.
9. *BLUMEA GLOMERATA*, DC. ; F. B. I. iii. 262.
N. Circars, in the undergrowth of Sal forests in Ganjam ;
Deccan, Nallamalai forests of Kurnool, hills of Mysore.
An erect distinct-looking herb with reddish bracts.
10. *BLUMEA BARBATA*, DC. ; F. B. I. iii. 262.
W. Gháts, Pulney Hills and hills of Travancore and Tinnevely,
at low elevation.
A slender silky herb, resembling *B. cernua*, flowers yellow.
11. *BLUMEA LACERA*, DC. ; F. B. I. iii. 263.
Var. *glandulosa*, Hook. f. More or less glandular, the leaves short
and little-toothed, the flowers in heads on the many branchlets.
Nearly all Districts, but especially Western ones, usually at low
elevations.
A large strong-smelling herb, with thin, very variable leaves
and yellow flowers.
12. *BLUMEA HIERACIFOLIA*, DC. ; F. B. I. iii. 263 ; Wt. Ic. t. 1099.
W. Gháts, Nilgiri and Pulney Hills, above 6,000 ft., in wet places
and on the banks of streams.
A simple or sparingly branched, usually scapigerous herb with
one close terminal cluster of heads and small stem leaves, flowers
yellow.
Var. *macrostachya*, Hook. f. A taller, stronger herb with simple
or branched inflorescence, larger flowers and leaves, especially on the
stem, and usually with much white silky wool.
N. Circars, hills of Vizagapatam at 5,000 ft. (A. W. Lushington) ;
W. Gháts, Nilgiri and Pulney Hills and hills of Tinnevely above
6,000 ft., most common in the Pulneys.
13. *BLUMEA VIRENS*, DC. ; F. B. I. iii. 264.
N. Circars, Deccan and W. Gháts in hilly forest country and
up to 5,000 ft.
A tall slender glabrous herb with yellow flowers. The var.
minor, Hook. f., is clearly only a dwarf form.
14. *BLUMEA MEMBRANACEA*, DC. : F. B. I. iii. 265.
N. Circars and Deccan in forest country, E. slopes of W. Gháts
at low elevation.
Var. *gracilis*, Hook. f. Heads quite small, the panicle-branches
racemose.
W. Coast, in Malabar (?).
Var. *Gardneri*, Hook. f. Heads large, on large terminal corymbose
branches.
W. Gháts, Nilgiri and Pulney Hills above 5,000 ft.

15. *BLUMEA LACINIATA*, DC. ; F. B. I. iii. 264.
N. Círcars, forest parts of Ganjam (Gamble).
A stout villous herb.
16. *BLUMEA JACQUEMONTII*, Hook. f. ; F. B. I. iii. 265.
E. Gháts, Mahendragiri in Ganjam at 4,500 ft. (Gamble, Fischer and Gage), Rumpa Hills in Godavari (Gamble); W. Gháts, at Coonoor, Nilgiris. 5,000 ft. (C. B. Clarke).
A coarse glandular herb with yellow flowers and stiff, coloured, involucre bracts.
17. *BLUMEA MALABARICA*, Hook. f. ; F. B. I. iii. 267.
W. Coast, in S. Canara and Malabar; W. Gháts, Bababudan Hills of Mysore at 3,500 ft.
A tall erect plant with narrow leaves.
18. *BLUMEA FLEXUOSA*, C. B. Clarke ; F. B. I. iii. 267.
W. Gháts, hills of Mysore at 3,500 ft., Sispara in Nilgiris about 6,000 ft., hills of Travancore at 6,000 ft.
A tall plant with large soft spreading inflorescence.
19. *BLUMEA SPECTABILIS*, DC. ; F. B. I. iii. 269.
W. Gháts, in all Districts though scarce, up to 2,000 ft. in the Bolumpatti Valley, Coimbatore and the Attapadi Valley of Malabar (Fischer).
A tall shrubby species with yellow flowers, the pappus red or white.

17. *Laggera*, Sch.-Bip.

Annual or perennial herbs. *Leaves* alternate, often rigid and decurrent in a wing to the stem. *Heads* heterogamous, not rayed, panicled or axillary, the outer flowers ♀, many-seriate, the inner ♂, many, fertile. *Involucre* campanulate; bracts many-seriate, narrow, often rigid, the outer shorter. *Receptacle* flat, naked. *Corollas* of ♀ flowers filiform, the mouth minutely toothed; of ♂ flowers tubular, limb 5-lobed. *Anther-bases* 2-lobed or sagittate, not tailed. *Style*-arms of ♀ slender, of ♂ slightly flattened. *Achenes* small, subterete, angled or ribbed; pappus 1-seriate, the hairs slender, often caducous.

Flowers yellow; stems slender, not winged; leaves cordate and semi-amplexical at base, ovate-oblong, coarsely-toothed, glabrous; achenes minute, pale, angled, smooth.....1. *flava*.
Flowers purplish or pink; stems thick, more or less winged; leaves decurrent on the stem at their base:—

Leafy wings of the stout stem entire and continuous, the leaves oblong, obtuse or slightly acute, denticulate; heads in short racemes on short peduncles; anther-bases sagittate; achenes oblong, dark, faintly ribbed and silky-villous.....2. *alata*.

Leafy wings of the slender stem deeply lobed, often discontinuous, the leaves oblanceolate, acute, serrate; heads on slender peduncles at the ends of the branches; anther-bases obtuse; achenes narrow, dark, faintly ribbed and puberulous.....3. *pterodonta*.

Leaves shortly or not decurrent in wings on the stem, oblanceolate, deeply cut or pinnatifid, auricled at base; heads in terminal panicles of corymbs, long-peduncled; anther-bases sagittate; achenes dark red, somewhat flattened, obscurely ribbed.....4. *aurita*.

1. *LAGGERA FLAVA*, Benth. ; F. B. I. iii. 270.
N. Circars, in the forests of Ganjam and Vizagapatam, especially under Sál; W. Gháts, Travancore Hills up to 3,500 ft. (Beddome).
A rather conspicuous herb from its bright yellow flowers in loose-panicled cymes, and rather large glabrous leaves.
2. *LAGGERA ALATA*, Sch.-Bip. ; F. B. I. iii. 271. *Blumea alata*, DC. ; Wt. Ic. t. 1101.
N. Circars, Mahendragiri Hill in Ganjam at 4,500 ft. (Gamble); hills of the Deccan and Carnatic; W. Gháts, Mysore hills, Nilgiris, Pulneys and hills of Tinnevely, up to 7,000 ft.
A stout rough leafy herb with conspicuously winged stems and drooping flowers. Fyson says the young leaves smell like Blackcurrants.
3. *LAGGERA PTERODONTA*, Benth. ; F. B. I. iii. 271. *Blumea pterodonta*, DC. ; Wt. Ic. t. 1100.
N. Circars, in Ganjam (Barber); Deccan, hills of Cuddapah (Beddome); W. Gháts, Nilgiri and Pulney Hills at about 3,000—5,000 ft.
A more slender herb nearly glabrous.
4. *LAGGERA AURITA*, Sch.-Bip. ; F. B. I. iii. 271.
All dry Districts, especially on the E. Coast.
A slender viscidly pubescent herb, said to smell of turpentine.

18. *Pluchea*, Cass.

Shrubs or undershrubs, rarely herbs, tomentose or glutinous. *Leaves* alternate. *Heads* heterogamous, not rayed, white yellow or lilac, small in terminal corymbs or large and subsolitary, the outer flowers ♀, many-seriate, fertile, the inner ♂ few, sterile. *Involucre* ovoid or campanulate; bracts ovate or lanceolate, usually broad, dry, rigid. *Receptacle* flat, naked. *Corollas* of ♀ flowers filiform, minutely toothed; of ♂ flowers tubular with a slightly enlarged 5-lobed limb. *Anther-bases* sagittate, tailed. *Style-arms* of ♀ slender, of ♂ entire or bifid. *Achenes* small, 4—5-angled; pappus 1-seriate, the hairs slender, free or sometimes connate.

PLUCHEA TOMENTOSA, DC. ; F. B. I. iii. 272.

Deccan, in Mysore, Bellary and Coimbatore; W. Gháts, Courtallum in Tinnevely (Wight).

A large shrub with broadly obovate, dentate, subamplexicaul and auricled leaves, corymbose flowers and 5-angled achenes ciliate on the angles.

19. *Epaltes*, Cass.

Herbs, erect or diffuse. *Leaves* alternate, usually decurrent, toothed. *Heads* heterogamous, small, disciform, solitary or corymbose; the outer flowers ♀, many-seriate, fertile, the inner ♂, usually sterile. *Involucre* hemispheric or broadly campanulate; bracts many-seriate, dry, rigid. *Receptacle* flat or convex, naked. *Corollas* of ♀ flowers filiform, minutely

2—3-toothed; of ♂ flowers tubular or funnel-shaped, the limb 3—5-lobed. *Anther*-bases sagittate, shortly tailed. *Style*-arms of ♀ slender, of ♂ entire or bifid, papillose. *Achenes* of ♀ flowers smooth or ribbed, of ♂ usually abortive; pappus 0 or in some ♂ flowers of 2—3 caducous hairs.

Heads 2—3 in. in diam.; involucre bracts longer than the flowers; achenes obovoid, ribbed and glandular, pale.....1. *divaricata*.
Heads 1—2 in. in diam.; involucre bracts shorter than the flowers; achenes ellipsoid, much smaller, smooth and slightly angled, black.....2. *pygmaea*.

1. *EPALTES DIVARICATA*, Cass.; F. B. I. iii. 274.

All plains Districts in dry country, in watery places.

2. *EPALTES PYGMAEA*, DC.; F. B. I. iii. 274.

E. Coast Districts from Madras to Tinnevely.

20. *Sphaeranthus*, Linn.

Annual herbs with spreading branches. *Leaves* alternate, toothed, decurrent on the stem. *Heads* small, heterogamous, not rayed, collected together in close terminal globose or ovoid clusters, the said clusters crowded on a large common receptacle and often having a general involucre of empty bracts at their base, each head with few or many outer flowers ♀, fertile, and few inner flowers ♂, fertile or sterile. *Involucre* narrow, with few or many paleaceous bracts. *Receptacle* small, naked. *Corollas* of ♀ flowers slender, tubular, minutely 2—3-toothed, of ♂ with tubular funnel-shaped or globular thickened tube and 4—5-lobed limb. *Anther*-bases sagittate, auricles acute or tailed. *Style*-arms filiform, sometimes connate. *Achenes* terete or angled, glabrous or villous, often glandular, those of ♀ and ♂ often different; pappus 0.

Clusters of heads ovoid, 5—1 in. long, spinous from the exerted tips of the bracts; outer involucre present; ♂ corolla tubular; leaves linear-oblong, obtuse, serrulate, slightly decurrent; achenes of ♀ stalked, ovoid, villous, of ♂ larger, sessile, glabrous

1. *amaranthoides*.

Clusters of heads globose, bracts not exerted, no outer involucre; leaves long-decurrent:—

Clusters 2—4 in. in diam., bracts spathulate, dentate at apex; wings of stem entire, leaves obovate, denticulate, glabrous; ♂ corolla funnel-shaped; achenes small, angled, glandular.....2. *africanus*.
Clusters 5—6 in. in diam., bracts spathulate, acute, ciliate; wings of stem toothed; leaves obovate-oblong, toothed or serrate, villous; ♂ corolla globosely inflated below; achenes angular, subglabrous.....3. *indicus*.

1. *SPHAERANTHUS AMARANTHOIDES*, Burm. f.; F. B. I. iii. 274. *Oligolepis amaranthoides*, Wt. Ic. t. 1149.

Deccan and Carnatic from Mysore southwards, in rice-fields and near the sea-coast.

An erect stout-stemmed herb, smelling of mint, the head-clusters cone-like, red.

2. *SPHAERANTHUS AFRICANUS*, Linn.; F. B. I. iii. 275.

E. Coast, in S. Canara and Malabar, in swampy places.

A slender glabrous fragrant herb with white (Rangachari) or purple (Cooke) flowers.

3. SPHAERANTHUS INDICUS, Linn.; F. B. I. iii. 275. *S. hirtus*, Willd.; Wt. Ic. t. 1094.

All plains Districts, in wet places, especially rice-fields, common. An aromatic herb with glandular-hairy stem and branches and pink or purple flowers.

21. *Blepharispermum*, Wight.

Glabrous shrubs. *Leaves* alternate, entire or toothed. *Heads* small, heterogamous, not rayed, collected together in close globose clusters, the said clusters sessile on an oblong or cylindric common receptacle bracteate at the base, each head with few outer flowers ♀, fertile, and few inner flowers ♂, fertile or sterile. *Involucre* of 1—2 bracts shorter than the paleae of the receptacle. *Receptacle* small or cylindric with rigid paleae enclosing the flowers. *Corollas* of ♀ flowers slender, tubular; 3—4-lobed, of ♂ tubular, enlarged above, the limb campanulate 5-lobed. *Anther*-bases sagittate, the auricles tailed, connate. *Style*-arms of ♀ linear, of ♂ stout, obtuse, papillose. *Achenes* of fertile flowers compressed, black, the margins ciliate, the outer ones with a ciliate rib; pappus in sterile flowers 0, in fertile flowers of unequal paleae or bristles.

Leaves long petioled, ovate, membranous, acuminate, up to 7 in. long, 3 in. broad; bracts of common receptacle small; clusters of heads 3—6 in. in diam. in long-peduncled corymbs.....1. *petiolare*.
Leaves short petioled, elliptic or obovate, coriaceous, obtuse or slightly acute, up to 5 in. long, 2.5 in. broad; bracts of common receptacle leafy; clusters of heads 1—1.5 in. in diam., solitary.....2. *subsessile*.

1. BLEPHARISPERMUM PETIOLARE, DC.; F. B. I. iii. 276; Wt. Ic. t. 1092.
W. Ghâts, hills of Tinnevely at about 1,000 ft.
A glabrous shrub, climbing by means of its divaricate branches, the woody stem attaining nearly 1 in. in diam.; bark grey (Trimen Fl. Ceyl. iii. 27).
2. BLEPHARISPERMUM SUBSESSILE, DC.; F. B. I. iii. 276; Wt. Ic. t. 1093.
Deccan, in Mysore, Ramandrúg in Bellary to N. Nilgiris, at 2,000—3,000 ft.
An erect shrub about 3 ft. high.

22. *Anaphalis*, DC.

Perennial herbs or small shrubs, cottony or woolly. *Leaves* alternate. *Heads* heterogamous, not rayed, corymbose, outer flowers ♀, in many rows, fertile; inner ♂, usually sterile. *Involucre* campanulate turhinate or subglobose, usually woolly at base; bracts many-seriate, the outer sessile, the middle ones longer and clawed, the inner narrow and clawed, the limb white or tinged with yellow or pink. *Receptacle* naked. *Corollas* of ♀ flowers filiform, 2—4-toothed; of ♂ flowers tubular, limb 5-toothed, often glandular, all usually yellow. *Anther*-bases sagittate, tailed, the auricles connate. *Style*-arms obtuse or capitate. *Achenes* small, oblong, terete or angled, usually minutely scaly or papillose; pappus 1-seriate, the hairs sometimes connate at the base, but usually free and caducous, scabrid, the tips often feathery.

Leaves prominently 5-ribbed from the narrowed semi-amplexicaul base, the margins only sometimes folded back, both surfaces covered with densely appressed cinnamonaceous or greyish tomentum, up to 4 in. long, .75 in. broad; heads small, in dense rounded corymbose clusters, ♂ flowers about 16; bracts oblong, obtuse, white; achenes oblong, papillose-scabrous.....1. *Beddomei*.

Leaves 3- or more-ribbed from the base, the ribs concealed by soft cottony wool:—
Leaf margins prominently folded back, the leaves oblong or oblong-lanceolate, densely congested at the base and deflexed, sparse above, up to 1.5 in. long; heads large, .4 in. in diam., in compact terminal woolly corymbs, flowers very many; bracts white, the limb ovate, recurved; achenes minutely scaly

2. *travancorica*.

Leaf-margins flat, not or very slightly folded back:—

Leaves elliptic, covered with white wool, obtuse at base and slightly decurrent, up to 2 in. long, 1 in. broad; heads small, .2—3 in. broad, in densely compacted terminal single or branched corymbs, ♂ flowers about 12, sometimes 0; bracts white, tinged when fresh with pink or yellow, limb lanceolate, acute; achenes white-hairy.....3. *elliptica*.

Leaves oblong, covered with smoky or tawny wool, semi-amplexicaul, up to 1 in. long, .25 in. broad; heads very small, .1—2 in. broad, in many-branched terminal corymbs, ♂ flowers about 30; bracts yellow or pink, oblong or obovate, the apex toothed; achenes papillose.....4. *Notontiana*.

Leaves 1-ribbed only but sometimes with oblique nerves not starting from the base:—

Leaves usually 1 in. long or more:—

Leaf-margins flat, leaves linear-oblong, acute, subamplexicaul and very slightly decurrent, up to 1—1.5 in. long, the basal short and obovate, closely white-woolly; heads small, .25 in. broad, in close terminal sometimes branched corymbs, ♂ few or many, usually fertile; bracts white or pink-tinged, acute; achenes papillose.....5. *subdecurrens*.

Leaf-margins flat, not folded back except the upper ones of the scape, which are closely pressed and ascending; leaves linear-oblong or oblanceolate, very white-woolly, 1—3.5 in. long, .3 in. broad; heads .2—3 in. broad, in broad corymbs of many branches; bracts white, limb ovate, acute; achenes minute, scaly.....6. *Lawii*.

Leaf-margins always folded back:—

Leaves glabrous and dark green on the upper surface except when quite young, linear, 1—2 in. long, .1 in. broad, spreading or reflexed; heads small, in dense rounded, single or branched corymbs; bracts white, the limb lanceolate, acute; achenes pubescent.....7. *marcescens*.

Leaves crispately scabrous on the upper surface, semi-amplexicaul at base; heads in compact clusters:—

Heads small, .1 in. broad, few flowered; bracts oblanceolate, dentate at tip; leaves tapering upwards from a broad base to the slender apex, not decurrent, under surface with grey wool; achenes papillose.....8. *aristata*.

Heads .25 in. broad, many-flowered; bracts oblong, acute; leaves linear-oblong, obtuse at apex, the upper stem leaves shortly hooked, under-surface with grey or white wool; achenes roughly papillose.....9. *Wightiana*.

Leaves softly cottony on both surfaces, linear or linear-oblanceolate, 1—2 in. long, .1 in. broad, mucronate; heads few, large, .3 in. broad, many-flowered, in small subumbellate terminal corymbs; bracts white, lanceolate, acute; achenes short, angular, minutely papillose.....10. *leptophylla*.

Leaves less than 1 in. long, usually under .3 in., the margins revolute; subshrubby plants with many flowerless leafy branchlets:—

Cauline leaves very many, close, spreading or curved upwards, linear, .3 in. long; heads very small, .15 in. broad, in close terminal corymbs .5—7 in. broad; bracts yellowish-white, the limb orbicular; achenes elongate, angled, minutely papillose.....11. *Meeboldii*.

Cauline leaves distant, appressed, linear, .3—4 in. long:—

Branches slender, flowering ones elongate, to 12 in. or more, non-flowering 1—3 in., the leaves not very closely compacted; heads .3—4 in. broad, in

compact terminal corymbs about .75—1 in. broad; bracts white, the limb ovate, acute; achenes 3—4-angled, minutely scaly.....12. *Bournei*.
Branches thick, woody, flowering ones 3—10 in. long, non-flowering very short, scarcely 1 in., densely compacted; heads .2—25 in. broad, in compact terminal corymbs 1—1.5 in. broad; bracts with the limb ovate, usually obtuse; achenes terete, minutely scaly.....13. *Neelgerryana*.

1. *ANAPHALIS BEDDOMEI*, Hook. f.; F. B. I. iii. 282.
W. Gháts, Pulney Hills, about 7,000 ft., on the downs.
A loose undershrub, the main stem decumbent, the branches erect, leafy.
2. *ANAPHALIS TRAVANCORICA*, W. W. Smith in Rec. Bot. Surv. Ind. iv. 284.
W. Gháts, Pulney Hills and hills of Travancore, above 7,000 ft.
A large herb, somewhat shrubby at base, with large flower-heads.
3. *ANAPHALIS ELLIPTICA*, DC.; Wt. Ic. t. 1118. *A. oblonga*, DC. var. *elliptica*, Hook. f.; F. B. I. iii. 283.
W. Gháts, Nilgiri and Anamalai Hills, above 7,000 ft.
A soft very white woolly herb, the bracts white or pink.
4. *ANAPHALIS NOTONIANA*, DC.; F. B. I. iii. 284; Wt. Ic. t. 1116.
W. Gháts, Nilgiri Hills, above 7,000 ft.
A well-marked pretty herb with yellow or pink bracts and tawny tomentum.
5. *ANAPHALIS SUBDECURRENS*, Gamble n. comb. *Gnaphalium subdecurrens*, DC. in Wt. Contrib. 21. *A. oblonga*, DC.; F. B. I. iii. 283 in part.
W. Gháts, in all Districts from Coorg southwards above about 4,000 ft., in grassy lands and on the downs.
A variable herb, at high elevations and in dry places short and compact and much branched; at lower ones the corymb-bearing stems longer, the corymbs more branched and the leaves more scattered.
6. *ANAPHALIS LAWII*, Gamble n. comb. *A. oblonga*, DC. var. *Lawii*, Hook. f.; F. B. I. iii. 283.
N. Circars, Mahendragiri Hill in Ganjam at 4,500 ft.; Deccan, on Nandidrúg; W. Gháts, Coorg, Bababudan Hills of Mysore, Brahmagiris, hills of Coimbatore, N. Nilgiris, Anamalais, Pulneys and hills of Tinnevely, at 5,000—7,000 ft.
A wide-spread, common and variable, very white and tall herb, the bracts sometimes pinkish.
7. *ANAPHALIS MARCESCENS*, C. B. Clarke; F. B. I. iii. 286. *Gnaphalium marcescens*, Wt. Ic. t. 1115.
W. Gháts, Nilgiri Hills, on the banks of streams, above 7,000 ft.; Coorg, at Mercara (Bourne).
A graceful small species, the corolla-lobes very glandular.
8. *ANAPHALIS ARISTATA*, DC.; F. B. I. iii. 285; Wt. Ic. t. 1119.
W. Gháts, Nilgiri and Pulney Hills, above 6,000 ft.
A strong-smelling viscid herb with woody rootstock, the bracts pink-tipped.

9. *ANAPHALIS WIGHTIANA*, DC. ; F. B. I. iii. 286 ; Wt. Ic. t. 1117.
W. Gháts, Nilgiri and Pulney Hills and hills of Tinnevely, above 6,000 ft., in cool places and on the banks of streams.
An erect herb with woody rootstock, the bracts white.
10. *ANAPHALIS LEPTOPHYLLA*, DC. ; F. B. I. iii. 285.
W. Gháts, Nilgiris, Pulneys and hills of Travancore and Tinnevely, above 5,000 ft., in damp places on the downs.
A very slender herb with large flower-heads.
11. *ANAPHALIS MEEBOLDII*, W. W. Smith in Rec. Bot. Surv. Ind. iv. 284.
W. Gháts, grassy hills in the Anamalais at 8,000 ft. (Barber, Fischer); Devicolam, Travancore, above 5,000 ft. (Meebold, Bourdillon).
A much-tufted woody plant about 1 ft. high with thick rootstock and many branches, both with flower-heads and without.
12. *ANAPHALIS BOURNEI*, Fyson in Kew Bull. 1914, 209.
W. Gháts, Nilgiris, Anamalais, Pulneys (common) and hills of Travancore above 6,000 ft.
A much-branched low bush with long slender flowering branches.
13. *ANAPHALIS NEELGERRYANA*, DC. ; F. B. I. iii. 287 ; Wt. Ic. t. 478.
W. Gháts, Nilgiri Hills, above 7,000 ft., usually on dry slopes and in rocky places.
A low, much-branched shrub.

23. *Gnaphalium*, Linn.

Hoary or woolly herbs. *Leaves* alternate, entire. *Heads* heterogamous, small, not rayed, in terminal or axillary corymbs or fascicles, outer flowers ♀, very many, in 2—many-rows, fertile, inner ♂, few, fertile. *Involucre* ovoid or campanulate; bracts many, imbricate, all scarious or with a white yellow or brown scarious blade, the claw usually thickened. *Receptacle* naked or pitted. *Corollas* of ♀ flowers filiform, 3—4-toothed, of ♂ flowers tubular, shortly 5-lobed. *Anther*-bases sagittate, with slender tails. *Style*-arms slender, truncate or capitate. *Achenes* small, oblong or obovoid, usually minutely scaly or papillose; pappus-hairs 1-seriate, plumose, slender or thickened at tip, more or less connate at base, caducous.

Heads in corymbs:—

Heads golden-yellow or brown; stems usually many from the roots, like the leaves softly white-woolly; leaves oblong-spathulate, semi-amplexicaul, upper lanceolate, about 2 in. long; ♂ flowers in each head about 4.....1. *luteo-album*.
Heads pale yellow; stems single, stout, branching above, not very woolly; leaves linear, acuminate, semi-amplexicaul and more or less decurrent, scaberulous above, not woolly, about 1—1.5 in. long; ♂ flowers in each head 10—12

2. *hypoleucum*.

Heads in leafy spikes, pale reddish- or yellowish-brown, the leaves and stems softly white-woolly; leaves linear-obovate or -spathulate, apiculate, usually under 1 in. long, but sometimes longer, ♂ flowers in each head 2—3; bracts linear-oblong, acute, the outer woolly.....3. *indicum*.

Heads in rounded, axillary or terminal leafy clusters, the whole plant white-woolly; leaves small, spathulate, the lower ones sometimes 1 in. long, the upper, which support the heads, much smaller; ♂ flowers about 4; bracts linear-lanceolate, acute.....4. *pulvinatum*.

1. GNAPHALIUM LUTEO-ALBUM, Linn. ; F. B. I. iii. 288.
Occasional, in most Districts, especially Nilgiris, about 7,000 ft., not common.
An annual wide-spread conspicuous weed.
Var. *pallidum*, Hook. f. Heads pale brown instead of golden yellow.
Nilgiri and Anamalai Hills at high levels (Beddome, Bourne).
2. GNAPHALIUM HYPOLEUCUM, DC. ; F. B. I. iii. 288 ; Wt. Ic. t. 1114.
W. Gháts, Nilgiri and Pulney Hills, above 7,000 ft.
An erect stout "everlasting."
3. GNAPHALIUM INDICUM, Linn. ; F. B. I. iii. 289.
All Districts, a common weed of roadsides and waste lands.
A soft white woolly annual.
4. GNAPHALIUM PULVINATUM, Delile ; F. B. I. iii. 289.
N. Circars, in Ganjam, roadsides and waste lands.
A soft prostrate woolly annual.

24. Helichrysum, Gaertn.

Herbs or shrubs, often woolly. *Leaves* alternate, entire. *Heads* heterogamous or homogamous, not rayed, solitary or in corymbs ; in homogamous heads all flowers ♂, in heterogamous heads outer 1 or rarely 2 rows ♀, fertile, inner ♂, usually fertile. *Involucre* various ; bracts many-seriate, scarious, imbricate, yellow red brown or white. *Receptacle* flat, naked or pitted, the pit-margins bristly or paleaceous. *Corollas* of ♀ flowers filiform, minutely toothed, of ♂ tubular, the limb 4—5-toothed. *Anther*-base sagittate, tailed. *Style*-arms of ♀ slender, of ♂ thickened, subcapitate. *Achenes* small, terete angled or sub-compressed, often papillose-scabrous ; pappus 1-many-seriate, free or connate below, dilated or feathery above.

All leaves from the base to the inflorescence similar or nearly so, the cauline spreading:—

Shrub ; leaves thick, lanceolate, usually 5 in. broad, glabrous above, grey or cinnamomeous-cottony beneath, 5—7-ribbed, the ribs impressed, apex acute and hooked, base semi-amplexicaul, margins often folded back ; bracts yellow, the limb short, obtuse ; achenes scabrid.....1. *buddleioides*.
Undershrub ; leaves thin, oblanceolate, usually 1 in. broad, glabrous above when old, sparsely cottony when young, softly cinnamomeous-cottony beneath, 5-ribbed, the ribs not impressed, apex obtuse or acute and then hooked, base semi-amplexicaul, margins sometimes slightly folded back ; bracts pale yellow or white, the limb short and obtuse ; achenes scaly.....2. *Hookerianum*.
Basal leaves much larger than the cauline, which are small and appressed:—
Basal leaves in rosette covered with soft spreading tawny wool, thin, 5-ribbed, the ribs not impressed, lanceolate from a broad base, up to 3 in. long, 1 in. broad, cauline leaves about 1 in. long, lanceolate, acute ; bracts white or yellowish, the limb ovate, obtuse or acute ; achenes black, scaly.....3. *perlanigerum*.
Basal leaves in short flowerless branches from a woody rootstock, linear lanceolate, thick, acute and hooked at tip, semi-amplexicaul, prominently 5—7-ribbed, the ribs impressed, both surfaces with appressed cinnamomeous wool, margins folded back ; bracts white or yellowish, rather long, the limb ovate, acute ; achenes scaly.....4. *Wightii*.

1. HELICHRYSUM BUDDLEIODES, DC. ; F. B. I. iii. 290 ; Wt. Ic. t. 1113.
W. Gháts, Bababudan Hills of Mysore, Nilgiris, Anamalais and Pulneys, above 6,000 ft.

A shrub reaching 12 ft. in height with conspicuously ribbed leaves. Bark brown, fibrous; wood grey, hard and close-grained.

2. *HELICHRYSUM HOOKERIANUM*, W. & A. in DC. Prod., vi. 201. *H. buddleioides*, var. *Hookeriana*, Hook. f.; F. B. I. iii. 291.

W. Ghâts, Anamalais, Pulneys and hills of Travancore and Tinnevelly at 3,000—4,500 ft.

An undershrub with much soft wool.

3. *HELICHRYSUM PERLANIGERUM*, Gamble in Kew Bull. 1920. 341.

W. Ghâts, Anamalai Hills at 6,000—7,000 ft. (Beddome).

An undershrub with very soft spreading floccose wool.

4. *HELICHRYSUM WIGHTII*, C. B. Clarke; F. B. I. iii. 291.

W. Ghâts, Nilgiris, above Sispara at 7,500 ft. (Wight, Lawson, Gamble).

A herbaceous plant with many flowerless and few flower-bearing branches from a woody rootstock.

25. *Carpesium*, Linn.

Erect branched herbs. *Leaves* alternate. *Heads* heterogamous, not rayed, yellow, usually drooping, terminal or axillary, sessile or peduncled; outer flowers ♀, fertile, inner ♂, fertile. *Involucre* hemispheric or subglobose; bracts in few series, inner dry, outer with foliaceous tips. *Receptacle* flat, naked. *Corollas* of both ♀ and ♂ all tubular, but the former without stamens; lobes 4—5. *Anther*-bases sagittate, tails slender. *Style*-arms linear, short, obtuse. *Achenes* elongate, striate, with an often glandular beak crowned by a thickened ring; pappus 0.

CARPESIMUM CERNUUM, Linn.; F. B. I. iii. 300.

Var. *nilagiricum*, C. B. Clarke. *C. nepalense*, Wt. Ic. t. 1120.

W. Ghâts, Nilgiri and Pulney Hills in Shola forests, above 6,000 ft.

An erect herb with yellow drooping solitary flowers and willows ovate-lanceolate, shortly serrate leaves up to 6 in. long, 2 in. broad. The achenes are sticky and are troublesome, adhering to the clothes.

Var. *ciliatum*, Hook. f. A slender herb with small elliptic-ovate or lanceolate slightly serrate leaves under 1 in. long, the heads .5 in. in diam.

Travancore (Herb. Rottler in Wall. Coll. 3214).

26. *Vicoa*, Cass.

Annual or perennial herbs. *Leaves* alternate, entire or toothed, the upper amplexicaul. *Heads* heterogamous, rayed, or (from absence of ray) homogamous and not rayed, solitary, terminal or on leaf-opposed peduncles; ray-flowers ♀, fertile, 1—2-seriate; disk-flowers ♂, many, fertile. *Involucre* campanulate; bracts many-seriate, narrow, with scarious margins, the outer shorter. *Receptacle* flat or subconvex, naked. *Corollas* of ray-flowers 2—3-toothed, of disk-flowers tubular, slender, shortly 5-lobed. *Anther*-bases sagittate, the tails slender. *Style*-arms of ♀ flowers linear, of ♂ flowers flattened, obtuse or truncate. *Achenes*

small, terete, villous; pappus of ray-flowers scanty or 0, of disk-flowers of few slender hairs.

Leaves sessile, lanceolate or oblong-lanceolate, auricled at base; involucre bracts erect; pappus of ray-flowers 0.....1. *indica*.
Leaves shortly petioled, elliptic-lanceolate, not auricled at base; involucre bracts squarrose; pappus of ray-flowers scanty or 0.....2. *cernua*.

1. *VICOA INDICA*, DC.; Wt. Ic. t. 1148. *V. auriculata*, Cass.; F. B. I. iii. 297.

All Forest Districts, in the undergrowth of deciduous forest, common.

An erect herb with bright yellow flowers.

2. *VICOA CERNUA*, Dalz.; F. B. I. iii. 297.

W. Gháts, hills of Mysore and Wynaad, at about 3,000—4,000 ft.

An erect annual slender herb.

27. *Pulicaria*, Gaertn.

Annual or perennial herbs, usually villous. *Leaves* alternate, sessile, often amplexicaul. *Heads* yellow, solitary, heterogamous and rayed or homogamous from the absence of rays; ray-flowers ♀, disk flowers ♂, fertile. *Involucre* hemispheric or obconic; bracts in few series, narrow, acuminate or awned. *Receptacle* flat or convex, pitted. *Corollas* of ♀ flowers ligulate and 2—3-toothed or tubular, of ♂ flowers tubular, slender, shortly 5-lobed. *Anther-bases* sagittate, the tails capillary, simple or branched. *Style-arms* of ♀ flowers slender, of ♂ flowers linear, obtuse, slightly flattened. *Achenes* terete or ribbed; pappus double, the outer of short jagged scales, the inner or scabrid or bearded filiform or flattened hairs.

Involucre bracts subequal; ray-flowers ligulate, achenes sparsely hairy:—

Plant 1—2 ft. high; peduncles thickened upwards; leaves linear-oblong, serrate, pubescent, crowded on the stems, usually over .5 in. broad.....1. *Wightiana*.

Plant less than 1 ft. high; peduncles not thickened upwards; leaves linear-oblong, entire or serrulate, pubescent, distant on the stems, under .5 in. broad.....2. *angustifolia*.

1. *PULICARIA WIGHTIANA*, C. B. Clarke; F. B. I. iii. 298. *Callistephus Wightianus*, DC.; Wt. Ic. t. 1089.

Deccan and E. slopes of the Gháts, in dry hill forests, up to 4,000 ft.

A much branched annual leafy herb.

2. *PULICARIA ANGUSTIFOLIA*, DC.; F. B. I. iii. 299.

Deccan, in dry open forests in Kistna and Kurnool to Mysore and Bellary.

A branching annual with slender stems.

28. *Caesulia*, Roxb.

A glabrous marsh herb. *Leaves* alternate, lanceolate, serrulate. *Heads* axillary, sessile, homogamous, not rayed, all flowers ♂, fertile. *Involucre* large, membranous; bracts 2, orbicular or ovate. *Receptacle* with lanceolate stramineous paleae to the outer flowers, glabrous. *Corollas* tubular, deeply 5-lobed, the lobes linear. *Anther-bases* sagittate, tails of a bundle of fine hairs. *Style-arms* short, clavate. *Achenes*

flat, obovoid, winged on each side, sparsely hairy; pappus of 2 ovate scales above the wings.

CAESULIA AXILLARIS, Roxb. Cor. Pl. t. 93; F. B. I. iii. 291; Wt. Ic. t. 1102.

Most plains Districts, especially on E. Coast, in ricefields.

A prostrate or suberect herb with pale blue or lilac flowers in the axils of the narrow leaves.

29. *Xanthium*, Linn.

Annual herbs. *Leaves* alternate, toothed or lobed. *Heads* monoecious, not rayed, the ♂ in upper axils, globose, sterile; the ♀ below, 2-flowered, apetalous, fertile. *Involucre* of ♂ heads short, bracts few, small; of ♀ with the bracts united in a closed 2-horned utricle with 2 cells and clothed with hooked bristles. *Receptacle* of ♂ cylindric with hyaline paleae enclosing the flowers. *Corollas* of ♀ 0, of ♂ tubular, 5-lobed, very thin. *Anthers* distinct, the bases obtuse, the tips inflexed; filaments monadelphous. *Style-arms* of ♀ flowers 2, long, exerted, of ♂ short. *Achenes* 2 to each head, enclosed in a 2-beaked utricle formed by the hardened involucre and covered with hooked spines; pappus 0.

XANTHIUM STRUMARIUM, Linn.; F. B. I. iii. 303. *X. indicum*, Roxb.; Wt. Ic. t. 1104.

Most plains Districts, on waste ground, roadsides and rubbish-heaps, chiefly near houses.

A coarse annual plant with scabrid triangular-cordate, often 3-lobed, irregularly toothed leaves and large 2-celled fruit with strong hooks.

30. *Lagasca*, Cav.

Rigid villous or subglabrous herbs. *Leaves* opposite or alternate, entire or toothed. *Heads* 1-flowered on a common receptacle supported by bract-like leaves; all flowers ♂, fertile, white red or yellow. *Involucre* tubular; bracts 4—5, connate. *Receptacle* small. *Corolla* regular, tube short, limb elongate, cylindric or dilated, lobes 5. *Anther-bases* sagittate, auricles obtuse. *Style-arms* long, curved, hairy. *Achenes* cuneate, compressed or 3-angled; pappus a toothed or limbrate cup.

LAGASCA MOLLIS, Cav.; F. B. I. iii. 302.

Deccan, in Cuddapah, Chittoor, Bellary and Mysore, an introduced Central American plant, now run wild.

A grey-pubescent herb with ovate acuminate leaves and white flowers in a solitary head-like terminal leafy inflorescence.

31. *Moonia*, Arn.

Herbs or undershrubs. *Leaves* opposite, petioled, entire or pinnate, toothed. *Heads* heterogamous, rayed, solitary on terminal or axillary slender peduncles; outer flowers ♀, fertile, uniseriate, inner ♂, many sterile. *Involucre* campanulate, bracts few, usually 2-seriate, thin, leafy, the outer larger and often recurved. *Receptacle* flat, with oblong membranous scales embracing the disk flowers. *Corollas* of ♀ flowers with a 3-fid ligule, of ♂ tubular, 4—5-lobed. *Anther-bases* subsagittate.

Style-arms of ♀ 2, linear, revolute, of ♂ undivided, pubescent. *Achenes* obovoid, compressed, smooth, usually keeled at the margins; pappus 0 or of 2 minute hairs.

Rays of the ♀ flowers narrow, deeply cleft in linear lobes; bracts 2—3 in. long, ciliate on the margins.....1. *heterophylla*.
 Rays of the ♀ flowers broad, shortly and obtusely 3-lobed; bracts 4—5 in. long, not ciliate on the margins.....2. *Arnottiana*.

1. MOONIA HETEROPHYLLA, Arn. Pug. 31. *Chrysogonum heterophyllum*, C. B. Clarke; F. B. I. iii. 303.

W. Ghâts, Pulney Hills and hills of Tinnevely and Travancore, above 6,000 ft., in damp shady places.

A perennial undershrub with golden-yellow flowers and pinnate or deeply pinnatisect serrate leaves.

2. MOONIA ARNOTTIANA, Wt. Ic. t. 1015. *Chrysogonum Arnottianum*, C. B. Clarke; F. B. I. iii. 303.

W. Ghâts, Mysore, Nilgiri Hills, above 6,000 ft., on the margins of Sholas, especially between Avalanché and Sispara; Atapadi Hills of Malabar (Fischer).

A perennial undershrub, very like the last, but with larger yellow flowers.

Acanthospermum hispidum, DC., a South American introduced plant, has been found in S. Canara and Salem Districts, and is said to be spreading and likely to become common. The plant is hairy, the leaves obovate, spatulate; the heads in the forks of dichotomous branches, the achenes spinous.

32. Siegesbeckia, Linn.

Glandular pubescent herbs, annual. *Leaves* opposite, toothed, shortly petioled. *Heads* heterogamous, rayed, in leafy panicles; outer flowers ♀, fertile, 1-seriate, inner ♂, fertile or the innermost sterile. *Involucre* campanulate or hemispheric; bracts few, herbaceous, with many stalked viscid glands, outer narrow spatulate spreading, inner enclosing the ray-flowers. *Receptacle* small; paleae membranous, concave, enclosing the flowers. *Corollas* of ♀ ray-flowers spreading, 2—3 lobed; of ♂ flowers tubular and glandular hairy below with a campanulate 5-lobed limb. *Anther*-bases obtuse, tips incurved. *Style*-arms of both ♀ and ♂ 2, flattened, recurved. *Achenes* glabrous, obovoid, angled, often curved, truncate; pappus 0.

SIEGESBECKIA ORIENTALIS, Linn., F. B. I. iii. 304; Wt. Ic. t. 1103.

All Districts, in waste places, by roadsides and in second-growth forest, at all elevations.

A large annual herb with yellow flowers and large ovate-triangular deeply-cut leaves, the flower-heads glandular and very sticky, adhering to the clothing.

33. Eclipta, Linn.

Strigosely hirsute annuals. *Leaves* opposite. *Heads* small, heterogamous, rayed, on axillary or terminal peduncles; outer flowers ♀,

sub-biseriate, fertile or sterile, inner ♂, tubular, with 4—5 lobes, fertile. *Involucre* campanulate; bracts biseriate, leafy, the outer broad, about 5, inner narrower, about 3. *Receptacle* flattened, with plumose slender paleae to each flower. *Corollas* of ♀ flowers linear, entire or 2-fid, white; of ♂ tubular with 4—5 lobes. *Anther*-bases obtuse. *Style*-arms short, obtuse. *Achenes* of ray-flowers triquetrous, warted, of disk-flowers compressed; pappus of 1—2 minute teeth.

ECLIPTA ALBA, Hassk.; F. B. I. iii. 304.

All Districts and at all elevations, in waste places and on roadsides, common.

An annual herb with small flowers with white rays and lanceolate-oblong strigose leaves, branches erect or prostrate, the erect plants usually with lanceolate-oblong leaves often 3 in. long, the prostrate ones with short leaves scarcely .5 in. long, but there are many intermediate forms.

34. *Sclerocarpus*, Jacq.

Herbs, strigose or villous. *Leaves* opposite or alternate, petioled. *Heads* heterogamous, rayed, terminal or axillary or leaf-opposed; outer flowers ♀, 1-seriate, sterile, inner flowers ♂, fertile. *Involucre* campanulate; bracts few, biseriate, all or the tips herbaceous, outer spreading. *Receptacle* convex, with many chaffy paleae embracing the ♂ flowers and finally hardening round the achenes. *Corollas* of ray-flowers with broad spreading yellow 0—3-lobed ligules, of ♂ flowers tubular, 5-lobed. *Anther*-bases obtuse. *Style*-arms of ray-flowers recurved, slender, of ♂ flowers short, subclavate. *Achenes* obovoid, subcompressed, curved, narrowed below, enclosed in the rough, rugose or ribbed, often beaked paleae; pappus 0 or a short ring of scales.

SCLEROCARPUS AFRICANUS, Jacq.; F. B. I. iii. 305.

Deccan, Gersakal in Coimbatore, at 5,000 ft. (Fischer).

An erect annual herb with yellow flowers, ovate acute serrate strigosely hairy leaves and a beaked, ribbed fruit.

35. *Blainvillea*, Cass.

Erect, scabrid or villous herbs. *Leaves* opposite or the upper alternate, petioled, toothed. *Heads* small, heterogamous, rayed or subdisciform, terminal or axillary, subsessile or peduncled; the outer ♀, 1—2-seriate, fertile, the inner ♂, fertile. *Involucre* ovoid or subglobose; bracts few, outer herbaceous, inner passing into the paleae of the receptacle. *Receptacle* small, convex, with many folded, rigid, membranous paleae enclosing the flowers. *Corollas* of ♀ flowers of short 2—3-toothed ligules, sometimes absent, of ♂ tubular with campanulate 4—5-lobed limbs. *Anther*-bases obtuse. *Style*-arms of ♀ flowers short, flattened, of ♂ narrow, flattened. *Achenes* truncate, of ray 3-quetrous or compressed, of disk 3—4-angled or compressed; pappus 0, or of 2—5 short scales or bristles.

BLAINVILLEA RHOMBOIDEA, Cass. *B. latifolia*, DC.; F. B. I. iii. 305.

All Districts and up to 5,000 ft. in the hills, in fields and waste places, common.

A rigid scabrous herb with yellowish or white flowers; many branches, ovate serrate 3-nerved leaves and cuneate achenes marked with faint horizontal lines.

36. *Wedelia*, Jacq.

Herbs or shrubs, sometimes scandent, scabrid pubescent or hirsute. *Leaves* opposite, often triple-nerved. *Heads* heterogamous, rayed, yellow, axillary or terminal: outer flowers ♀, fertile, inner ♂, fertile, or the inner sterile. *Involucre* campanulate or subhemispheric; bracts usually biseriate, the outer herbaceous. *Receptacle* flat or convex with paleae folded or concave enclosing the flowers. *Corollas* of ♀ flowers ligulate, the ligules spreading, entire or 2—3-toothed; of ♂ flowers tubular with 5-lobed limb. *Anther*-bases entire or subsagittate. *Style*-arms of ♀ slender, of ♂ clavate, hairy. *Achenes* cuneate, triquetrous or compressed, truncate, smooth or tubercled; pappus 0 or a ring of small scales.

Heads solitary on slender peduncles 2—5 in. long; ray-ligules oblong, .2 in. long, 2—3-lobed; leaves linear-oblong or oblanceolate, subsessile, entire or irregularly subcrenate, roughly scabrous; achenes of ray triquetrous, of disk compressed, all tuberculate.....1. *calendulacea*.

Heads 1—3 together, peduncles under 3 in. long:—

Erect herbs; leaves ovate, acute or acuminate, closely and sharply serrate, hispid; heads usually solitary, ray-ligules suborbicular or oblong, .25 in. long, minutely emarginately lobed; achenes cuneate, triquetrous, truncate, smooth below, rough and hairy at apex.....2. *urticaefolia* var. *Wightii*.

Climbing shrub; leaves ovate, acute or acuminate, distantly serrate, pubescent but not hispid; heads usually in pairs, or threes in dichasia, ray-ligules obovate, .3 in. long, 2—3-lobed; achenes 3—4-angled, smooth, pubescent at the truncate apex.....3. *biflora*.

1. *WEDELIA CALENDULACEA*, Less.; F. B. I. iii. 306; Wt. Ic. t. 1107.

Plains Districts, especially on E. and W. Coast, in wet places.

A procumbent perennial, the stems rooting at the nodes.

2. *WEDELIA URTICAEOFOLIA*, DC.; F. B. I. iii. 306; Wt. Ic. t. 1106.

Var. *Wightii*, DC.

W. Ghâts, in all Districts, at about 3,000—5,000 ft.

An erect hispid herb, sometimes almost an undershrub.

3. *WEDELIA BIFLORA*, DC.; F. B. I. iii. 306; Wt. Ic. t. 1108.

E. and W. Coast, near the sea.

A climbing shrub.

37. *Spilanthes*, Linn.

Annual herbs. *Leaves* opposite. *Heads* heterogamous and rayed or homogamous and disciform, on long peduncles, axillary or terminal; ray-flowers when present 1-seriate, ♀ fertile; disk-flowers ♂ fertile. *Involucre* short, ovoid or campanulate; bracts sub-biseriate, unequal. *Receptacle* elongate, paleae enclosing the flowers often connate with the ovary as a stalk. *Corollas* of ♀ flowers ligulate, the ligule small, white or yellow; of ♂ tubular, limb, 4—5-lobed. *Anther*-bases truncate. *Style*-arms long, truncate. *Achenes* of ray triquetrous or dorsally compressed, of disk laterally compressed, ciliate or not at the margins, the

faces with short bulbous-based stiff hairs or glabrous; pappus 0 or of 2—3 bristles.

SPILANTHES ACMELLA, Murr.; F. B. I. iii. 307. *S. calva*, Wt. Ic. t. 1109.

All plains Districts, ascending the hills, a common weed.

An erect usually pubescent annual herb with ovate crenate leaves 1—2 in. long. Ligulate flowers are frequently absent. The achenes are normally ciliate on the margins, rough on the faces and with a pappus of 2—3 bristles, but a form (*var. calva*) otherwise the same has them nearly quite glabrous. The flower-heads when chewed have a hot burning taste. A larger form (*var. oleracea*) is cultivated in gardens.

38. *Synedrella*, Gaertn.

Annual, branched, pubescent or villous, herbs. *Leaves* opposite, petioled, toothed. *Heads* heterogamous, rayed, axillary and terminal; ray-flowers 1—2-seriate, ♀, fertile; disk-flowers ♂, fertile. *Involucre* ovoid or oblong; bracts few, 1 or 2 outer foliaceous, the rest passing into the paleae. *Receptacle* flat, paleae flat, scarious. *Corollas* of ♀ flowers ligulate, the ligule short, broad, 2—3-lobed, yellow; of ♂ flowers tubular, limb 4-lobed. *Anther*-bases obtuse. *Style*-arms of ♂ flowers with long acute tips. *Achenes* of ray-flowers dorsally compressed, winged, the wings lacerate; of disk-flowers narrow, compressed or triquetrous, often muricate; pappus of 2 slender awns.

SYNEDRELLA NODIFLORA, Gaertn.; F. B. I. iii. 308.

Plains Districts, occasional on cultivated lands, introduced from Mexico.

An erect dichotomous herb with ovate-lanceolate serrate 3-nerved leaves, and achenes of two very distinct forms, the outer ones winged and spinous on the wings, the inner black and slender and muricate.

Guizotia abyssinica, Cass., F. B. I. iii. 308, is Niger, an African plant cultivated as an oil-seed in the Deccan and Carnatic. It is a stout herb reaching 3 fr. in height and has conspicuous yellow flowers. Vern. *Hind.* Surguja, Ram-til.

39. *Glossocardia*, Cass.

An annual diffuse branched glabrous herb. *Leaves* alternate, 1—2-pinnatisect, the pinnules linear. *Heads* heterogamous, rayed, small, terminal and axillary; ray-flowers ♀, usually solitary, fertile; disk-flowers few, ♂, fertile. *Involucre* oblong; bracts few, outer 1—3, small, inner oblong, with broad membranous margins. *Receptacle* flat, small; paleae few, flat, linear-lanceolate, scarious. *Corolla* of ♀ flowers ligulate, the ligule bifid; of ♂ tubular with campanulate 4-lobed limb. *Anther*-bases obtuse. *Style*-arms of ♀ flowers very short, of ♂ flowers linear, acute, hispid at tip. *Achenes* narrowly oblong, much compressed dorsally, conspicuously ciliate on the margins, bearded on the face. Pappus of 2 smooth stiff awns.

GLOSSOCARDIA BOSVALLEA, DC.; Wt. Ic. t. 110. *G. linearifolia*, Cass.; F. B. I. iii. 308.

All plains Districts, in sandy places in dry country.

A pretty plant with conspicuous long-ciliate achenes. It has the scent of fennel.

40. *Bidens*, Linn.

Annual or perennial herbs, sometimes climbing. *Leaves* opposite, entire lobed or 1—2-pinnatisect. *Heads* heterogamous, rayed, in corymbose panicles or subsolitary; ray-flowers 1-seriate, neuter or rarely ♀, disk-flowers ♂, fertile. *Involucre* campanulate or hemispheric; bracts sub-biseriate, outer short, herbaceous, inner membranous. *Receptacle* flat or convex, paleae narrow, nearly flat, subtending the ♂ flowers. *Corollas* of ray-flowers ligulate, the ligules spreading, entire or slightly toothed, white or yellow; of disk-flowers usually yellow, tubular, the limb 5-lobed. *Anther*-bases obtuse or subsagittate. *Style*-arms of ♂ flowers oblong, acute, hairy at tip. *Achenes* 4-gonous or dorsally compressed, linear or cuneiform, often narrowed above; pappus of 2—4 persistent retrorsely barbellate awns.

BIDENS PILOSA, Linn.; F. B. I. iii. 309.

All Districts, both in the plains and hills, common but probably not truly indigenous.

An erect herb with variable leaves, flowers with white rays and yellow disk, the barbed achenes black and slender, about 5—7 in. long, troublesome from the way they adhere to the clothing. The cut-leaved form (var. *bipinnata*, Hook. f.) is the most common one.

B. humilis, H. B. and K., is a pretty yellow-flowered species which has run wild along roadsides in the Nilgiris (see Fyson Hillt. Fl. 237, t. 170).

Cosmos sulphureus, Cav., is a Mexican plant closely allied to *Bidens*, but with larger pink flowers and longer achenes. It is cultivated in gardens and is often found run wild.

41. *Glossogyne*, Cass.

Perennial glabrous herbs with almost naked scape-like stems and branches. *Leaves* mostly radical, crowded, pinnatifid or cuneate and 3-toothed, cauline alternate or the lower opposite or 0. *Heads* small, heterogamous, rayed, peduncled, corymbose; ray-flowers ♀, fertile, disk-flowers ♂, fertile. *Involucre* small, bracts 2—3-seriate, narrow, the bases connate. *Receptacle* flat; paleae scarious, flat or concave. *Corollas* of ray-flowers ligulate, spreading, entire or 2—3-lobed; of ♂ flowers tubular with 5-lobed limb. *Anther*-bases obtuse. *Style*-arms of ♀ flowers short, of ♂ with long hairy tips. *Achenes* dorsally compressed, linear ovoid or almost winged, truncate; pappus of 2 slender retrorsely barbellate awns.

GLOSSOGYNE PINNATIFIDA, DC.; F. B. I. iii. 310.

N. Circars and Deccan, up to 2,000 ft., on sandy ground.

A herb with thick rootstock, pinnatifid basal leaves with narrow lobes, very small cauline ones, small yellow flowers and flat striate achenes with barbed awns.

42. *Galinsoga*, Ruiz et Pav.

Annual herbs. *Leaves* opposite, entire or toothed. *Heads* small, heterogamous, rayed, peduncled, subterminal and axillary; ray-flowers few, ♀, 1-seriate, fertile; disk-flowers ♂, fertile. *Involucre* hemispheric, bracts few, 1–2-seriate, ovate, obtuse, striate. *Receptacle* conic or elongate; paleae slender, serrate. *Corollas* of ♀ flowers ligulate, white, obtuse, the tube with spreading hairs; of ♂ flowers tubular, limb 5-lobed. *Anther*-bases obtuse. *Style*-arms of ♀ spreading obtuse at tip, of ♂ acute, tip short. *Achenes* angled or the outer dorsally compressed, obovate, black, striate, and the inner minutely pubescent; pappus of a few linear scarious fimbriate scales, of ray-flowers 0.

GALINSOGA PARVIFLORA, Cav.; F. B. I. iii. 311.

Hills of the Deccan and W. Gháts, on roadsides and waste lands, a weed introduced from America.

A glabrous herb with very small flower-heads and ovate 3-nerved membranous leaves.

43. *Tridax*, Linn.

Perennial herbs. *Leaves* opposite, inciso-dentate or pinnatisect. *Heads* medium-sized, heterogamous, rayed; ray-flowers ♀, fertile, disk-flowers ♂, fertile. *Involucre* campanulate, few-seriate, outer broad, herbaceous, inner scarious. *Receptacle* flat or convex; paleae membranous. *Corolla* of ♀ flowers ligulate or 2-labiate, the outer lip large 3-lobed, the inner small 2-lobed; of ♂ flowers tubular, the limb 2-lobed. *Anther*-bases with short acute auricles. *Style*-arms hairy, the tips subulate. *Achenes* turbinate or oblong, silky; pappus of short or long aristate feathery bristles.

TRIDAX PROCUMBENS, Linn.; F. B. I. iii. 311.

All dry Districts, on roadsides and waste places, introduced from S. America.

A straggling hispid herb with much cut leaves, yellow flowers and achenes with feathery pappus.

44. *Flaveria*, Juss.

Nearly glabrous herbs. *Leaves* opposite, entire or dentate. *Heads* very small, heterogamous rayed, or homogamous with few ♂ flowers or reduced to 1 flower, ♀ or ♂, all fertile; collected in dense cymes surrounded by floral leaves, the cymes corymbosely paniculate or solitary, terminal, or in the axils of the dichotomous branches. *Involucre* of 2–4 elongate dry folded bracts, with sometimes a few smaller outer ones. *Receptacle* small, naked. *Corollas* of ♀ flowers tubular with a very small ligule; of ♂ flowers tubular, the limb 5-lobed. *Anther*-bases obtuse. *Style*-arms spreading, truncate. *Achenes* oblong, compressed, with 8–10 prominent ribs; pappus 0.

FLAVERIA AUSTRALASICA, Hook. ; Benth. Fl. Aust. iii. 546.

Most plains Districts, near the coast or inland, often in muddy places on river banks, introduced from Australia.

A glabrous yellow-flowered herb with dense clusters of heads frequently 1-flowered (both ♀ or ♂), oblong spathulate dentate leaves and flat ribbed achenes.

45. *Cotula*, Linn.

Annual or perennial, often creeping, small herbs. *Leaves* alternate, pinnatifid or pinnatisect, rarely entire or toothed. *Heads* small, heterogamous, not rayed, rarely homogamous; outer flowers ♀, 1—2-seriate, inner ♂, all fertile or inner sometimes sterile. *Involucre* hemispheric or campanulate; bracts sub-2-seriate, often with scarious margins. *Receptacle* naked. *Corollas* of ♀ flowers conic or 0, of ♂ flowers tubular, 4-lobed. *Anther*-bases obtuse. *Style*-arms truncate or obtuse, of sterile flowers sometimes entire. *Achenes* of ♀ or of all flowers stipitate, compressed, sometimes sheathed above by the base of the corolla, sometimes with a short auriculate pappus.

COTULA AUSTRALIS, Hook. f. ; Fl. N. Z. i. 128.

W. Gháts, Nilgiris, Pulneys and hills of Travancore, above 6,000 ft., probably introduced from Australia.

A small erect herb with pinnatifid leaves, small flower-heads on long filiform peduncles, no corollas to the ♀ flowers and achenes of two sorts, those of ray-flowers flat, winged and glandular, those of disk-flowers thick and not winged.

46. *Artemisia*, Linn.

Herbs or shrubs, usually strong-scented. *Leaves* alternate, entire incised or 1—3-pinnatisect. *Heads* small, heterogamous or homogamous, not rayed, solitary or fascicled, racemose or paniced; outer flowers ♀, 1-seriate, fertile, inner flowers ♂, fertile or sterile. *Involucre* ovoid subglobose or hemispheric, bracts few-seriate, the outer shorter, the margins scarious. *Receptacle* flat or convex, naked or hirsute. *Corollas* of ♀ flowers slender, tubular, shortly 2—3-lobed; of ♂ flowers tubular, the limb 5-lobed. *Anther*-bases obtuse. *Style*-arms of ♀ flowers stout or long and slender, of ♂ shorter and truncate, often penicillate, in sterile flowers often connate. *Achenes* very small, ellipsoid oblong or subobovoid, faintly striate; pappus 0.

Disk-flowers sterile; bracts ovate, glabrous, the margins scarious; lower leaves cuneate, with narrow stipule-like lobes at base, flabellately lobed at apex, deep green on both sides, glabrous or villous, uppermost small, entire.....1. *parviflora*. Disk-flowers fertile; bracts ovate or oblong, softly woolly, the margins scarious; lower leaves ovate in outline, deeply pinnatisect, with small stipule-like lobes at the base, pubescent above, white-tomentose beneath, uppermost small, 3-fid or entire, lanceolate.....2. *vulgaris*.

1. ARTEMISIA PARVIFLORA, Buch.-Ham. ex Roxb. ; F. B. I. iii. 322. *A. glabrata*, DC. ; Wt. Ic. t. 1111.

E. Gháts, hills of Ganjam; W. Gháts, in Mysore, the Coimbatore Hills, Nilgiris, Pulneys and hills of Travancore, above 3,000 ft.

A shrubby perennial herb.

2. *ARTEMISIA VULGARIS*, Linn.; F. B. I. iii. 325. *A. indica*, Willd., Wt. Ic. t. 1112.
W. Gháts, in all Districts, usually at 3,000—6,000 ft., and especially near villages and on old cultivated lands.
A tall aromatic shrub reaching 5—6 ft. high, often gregarious. The leaves of strong shoots are often 5—6 in. long and 3—4 in. broad.

47. *Gynura*, Cass.

Succulent herbs, rarely undershrubs, glabrous or hispid. *Leaves* alternate, entire toothed or pinnatisect. *Heads* homogamous, not rayed but disciform, solitary or corymbose, bracteolate at the base; flowers all ♂, fertile, or rarely a few outer ♀. *Involucre* cylindric, bracts 1-seriate, narrow, equal, the margins scarious. *Receptacle* flat, pitted or shortly fimbriate. *Corollas* regular, slender, yellow, tubular; limb slightly enlarged, 5-lobed. *Anther*-bases entire or subauricled. *Style*-arms slender; tips long, subulate, hispid. *Achenes* narrow, many-ribbed; pappus hairs many, soft, white.

Stout herbs with usually more than 5—7 heads in the long-peduncled and branched corymbs:—

Glabrous except below the heads, the stem stout and angular; leaves very variable, obovate or oblanceolate, coarsely and remotely toothed, narrowed or auricled or semi-amplexicaul at base; achenes sparsely hispid between the ribs.....1. *nitida*.
Hispid in all parts, the stem stout and furrowed; leaves oblong or oblanceolate, remotely serrate, lower ones narrowed, upper semi-amplexicaul at base; achenes closely brown-hispid.....2. *travancorica*.

Slender herbs with usually less than 5—7 heads in the long-peduncled shortly branched corymbs:—

Root not tuberous; leaves deeply and irregularly pinnatifid or lyrate, auricled at base; heads up to about 9, generally less; achenes sparsely hispid between the ribs.3. *lycopersicifolia*.
Root tuberous; leaves obovate or oblanceolate, entire or more or less deeply sinuately-lobed, the upper cauline only semi-amplexicaul; heads 1—5 usually; achenes villous.4. *Pseudo-china*.

1. *GYNURA NITIDA*, DC. in Wt. Contrib. 24; F. B. I. iii. 333; Wt. Ic. t. 1121.
Hills of the W. Deccan and W. Gháts, at about 3,000—6,000 ft., in dry open forest.
A tall fleshy herb with orange flowers.
2. *GYNURA TRAVANCORICA*, W. W. Smith in Rec. Bot. Surv. Ind. vi. 29.
W. Gháts, Pulney Hills and hills of Travancore, at 5,000—6,000 ft.
A tall, very hispid herb with yellow flowers.
3. *GYNURA LYCOPERSICIFOLIA*, DC.; F. B. I. iii. 334.
N. Circars, Mahendragiri Hill, Ganjam, 4,000 ft. (Fischer); W. Deccan, in Mysore and N. Coimbatore; W. Gháts, Nilgiri Hills (C. B. Clarke), at low levels, 1,500—4,000 ft., hills of Tinnevely, usually on river banks in evergreen forests.
A slender erect herb with yellow flowers.
4. *GYNURA PSEUDO-CHINA*, DC.; F. B. I. iii. 334.
W. Gháts, Courtallum in Tinnevely (Wight); hills of Travancore.
A short-stemmed tuberous-rooted herb.

48. Emilia, Cass.

Annual or perennial herbs, often glaucous, glabrous or with usually crispate pubescence. *Leaves* alternate, entire toothed or lyrate-pinnatifid, usually auricled and semi-amplexicaul, sometimes simply linear. *Heads* homogamous, not rayed, all discoid and ♂, fertile, solitary or in loose corymbs with long peduncles; no bracteoles. *Involucre* cylindric; bracts uniseriate, equal, free or cohering, reflexed in fruit. *Receptacle* flat, naked. *Corollas* slender, tubular, limb dilated, purple or red, lobes 5. *Anther*-bases obtuse or very minutely tailed. *Style*-arms, subterete, the hairy tip short and obtuse or long and acute. *Achenes* subterete or angled and 5-ribbed, glabrous pubescent or scabrid on the angles; pappus copious, white, soft, minutely hairy.

Leaves chiefly radical or for a short way up the stems, lyrate, prominently crenate, especially the rounded end lobe, crispately pubescent, 1—2 in. long; heads large, many-flowered, .5 in. long, the bracts .3 in.; corolla-lobes .1 in. long; style-arms truncate with a minute tip; achenes hispid on the angles.....1. *scabra*.

Leaves both radical and cauline, the upper cauline only much reduced:—

Heads small, under .5 in. long, few-flowered, the bracts as long, peduncles and often umbellate pedicels long, slender and spreading; leaves and stems soft, fistular, glaucous, glabrous or nearly so, the leaves lyrate-pinnatifid with large terminal lobe, up to 5 in. long, the basal leaves petioled, cauline acutely auricled; corolla-lobes very short; style-arms short with acute tip; achenes hispid on the angles.....2. *sonchifolia*.

Heads large, .5 in. long or longer, many-flowered, longer than the bracts; radical leaves few, lower cauline many:—

Stout and almost subshrubby with thick roots and almost distichous leaves, radical only lyrate, cauline ovate or obovate, acute, deeply sagittately auricled, glabrous or crispate-pubescent, entire to crenate on the margins; corolla-lobes .1 in. long; style-arms long with conical tip; achenes hispid on the angles, pubescent between them.....3. *flammea*.

Slender, erect, glabrous herbs, leaves narrow and linear-oblong, with deep sagittate basal auricles, the tips sometimes hooked; corolla-lobes .1 in. long; style-arms long with small conical tip; achenes white-hispid on the angles or nearly glabrous.....4. *zeylanica*.

Leaves all cauline and subsimilar, narrow and nearly or quite entire, linear-oblong or spatulate, glabrous above, softly crispate-hirsute beneath, the margins recurved, up to 2.5 in. long, .5 in. broad, obtuse at apex, narrowed at base with minute auricles; heads large, many-flowered, usually solitary on long peduncles; corolla-lobes .1 in. long, pubescent at tip; style-arms short with short tip; achenes hispid on the angles.....5. *ramulosa*.

1. EMILIA SCABRA, DC.; Wt. Ic. t. 1123. *E. sonchifolia* var. *scabra*, Hook. f.; F. B. I. iii. 336.

Hills of N. Circars; W. Gháts, above 5,000 ft., sometimes on rocks at high levels.

A short crispately pubescent herb with bright red flowers.

2. EMILIA SONCHIFOLIA, DC.; F. B. I. iii. 336.

All Districts in the plains, and up to 4,000 ft. in the hills, common and often found in rice-fields.

A soft straggling herb with purplish flowers.

3. EMILIA FLAMMEA, Cass.; F. B. I. iii. 336.

Deccan, hills of N. Coimbatore, at 4,000 ft.; W. Gháts, Bababudan Hills of Mysore, Nilgiris, Anamalais and Pulneys, above 6,000 ft., wide-spread and apparently wild, but probably an escape.

A stout, almost shrubby tall herb with scarlet flowers and very leafy branches.

4. *EMILIA ZEYLANICA*, C. B. Clarke ; F. B. I. iii. 336.

W. Ghâts, Pulney Hills and hills of Travancore and Tinnevely, above 4,000 ft.

A slender plant with narrow auricled leaves, said to have purple flowers.

Var. *paludosa*, Gamble.

W. Ghâts, lake-swamps and wet places in the Pulney Hills, above 6,000 ft. (Bourne).

A slender water-plant with purple flowers and very narrow leaves, of which few or none radical, the tips hooked, the heads few-flowered.

5. *EMILIA RAMULOSA*, Gamble in Kew Bull. 1921, ined.

W. Ghâts, Anamalai Hills (Fischer), hills of Travancore and Tinnevely, above 5,000 ft. (Beddome, Barber, Rangachari).

A wiry subshrubby branching herb.

49. *Notonia*, DC.

Undershrubs, glabrous and more or less fleshy. *Leaves* alternate, obovate or lanceolate, entire or serrate. *Heads* large, homogamous, not rayed, all $\frac{1}{2}$, fertile, in long-peduncled corymbs; bracteolate or not. *Involucre* cylindric; bracts uniseriate, equal. *Receptacle* flat, naked. *Corollas* tubular, slender; limb elongate, cylindric, shortly 5-lobed. *Anther*-bases entire. *Style*-arms elongate, tips short, ovate, papillose or hispid. *Achenes* long, subterete, 10-striate; pappus-hairs copious, white, slender, barbellate.

Stems and leaves fleshy; leaves obovate or oblanceolate or suborbicular, obtuse, variable in size but sometimes reaching 8 in. long, 4 in. broad, quite entire, glaucous-green; heads .75–1.25 in. long, the bracts .5–.75 in. long, broad; corolla-tube slender, .5–.7 in. long; achenes glabrous.....1. *grandiflora*.
Stems and leaves soft and slightly fleshy; leaves long-petioled, oblong-lanceolate, acuminate, reaching 8 in. long, 2–3 in. broad, serrate or crenate; heads .5–.6 in. long, the bracts as long, narrow; corolla-tube slender, .3 in. long; achenes sparsely hairy.....2. *Walkerii*.

1. *NOTONIA GRANDIFLORA*, DC. ; F. B. I. iii. 337. *N. corymbosa*, DC. ; Wt. Ic. t. 484.

Hills of the S. Deccan and Carnatic from Nellore and Cuddapah southwards, westwards to the E. slopes of the W. Ghâts in Nilgiris, Pulneys and hills of Tinnevely up to 5,000 ft.

A fleshy shrub reaching 5 ft. in height, with pale yellow flowers turning green. It is probable that in dry hot places the heads are few, in damper localities they are often in rather large corymbs (*N. corymbosa*, DC.). A Courtallum form has much thicker stems and nearly orbicular leaves.

2. *NOTONIA WALKERI*, C. B. Clarke ; F. B. I. iii. 337. *Gynura Walkerii*, Wt. Ic. t. 1122.

W. Ghâts, Nilgiris, in Shola forests above 7,000 ft.

A tall shrubby plant reaching 7 ft. in height, with large corymbs of yellowish-white flowers.

50. *Senecio*, Linn.

Herbs, undershrubs or shrubs. *Leaves* radical or alternate, entire or variously divided. *Heads* heterogamous rayed, or sometimes homogamous not rayed, usually yellow, solitary corymbose or recurved; ray-flowers ♀, fertile or neuter, disk-flowers ♂, fertile. *Involucre* of 1-seriate or nearly 2-seriate equal erect bracts, free or connate at the base, usually with short bracteoles below them. *Receptacle* flat or convex, naked, pitted or fimbriate. *Corollas* of ♀ flowers tubular below, ending in spreading ligules, which are sometimes small but usually large and prominently ribbed; of ♂ tubular, with a 5-fid campanulate limb. *Anther*-bases obtuse or auricled or minutely tailed. *Style*-arms of ♂ flowers recurved, the tips truncate or penicillate or shortly pointed. *Achenes* subterete or those of outer flowers compressed, 5–10-ribbed; pappus copious or not, usually soft and white, smooth scabrid or barbellate.

Erect herbs, all with yellow flowers:—

Ligules none; soft weed with pinnatifid glabrous leaves and small heads with soft white pappus and yellow flowers.....*vulgaris*.

Ligules present and usually conspicuous, yellow:—

All flowers, both ♀ ray and ♂ disk, with pappus to the achenes and fertile; heads in corymbs with small bracteoles at the base of the involucre and on the ultimate branches:—

Corymbs lax, spreading, with long peduncles and its branches; leaves distant, long:—

Pappus sordid; radical leaves rosulate, obovate obovate-oblong or spatulate, crenate, subpinnatifid or subentire; cauline linear-oblong or spatulate, lobulate, auricled at base, up to 7 in. long, 1–1.5 in. broad; bracts lanceolate, 10–14, acute, 3-nerved; achenes villous or puberulous.

1. *nudicaulis*.

Pappus white:—

Leaves long, narrow, linear, entire or obscurely toothed, glabrous or puberulous beneath, sometimes cottony, up to 6 in. long, .4 in. broad; bracts 16–20, linear, 1–3-nerved, ciliate at tip; achenes 10-ribbed, minutely scabrid on the ribs.....2. *zeylanicus*.

Leaves linear-oblong, lower often spatulate, cauline auricled and semi-amplexicaul, margins from nearly entire to almost pinnatifid, glabrous pubescent or even white-cottony beneath, up to 5 in. long; bracts 20 or more, narrow with a thickened rib, penicillate at tip; achenes ribbed, glabrous or very minutely papillose.....3. *neelgherryanus*.

Corymbs close, very bracteolate; leaves short, all cauline and with strongly recurved margins; achenes ribbed, glabrous:—

Leaves closely imbricate on the stem, conspicuously so near the middle, linear-oblong, 1 in. long, hispidly villous, the margins recurved; corymbs close with up to about 25 heads; bracts about 20, lanceolate, acuminate, scarious on the margins, ciliate at tip; ligules 4-nerved...4. *lavandulaefolius*.

Leaves scattered along the stem regularly from base to inflorescence, linear, up to .7 in. long, villous only on the midrib; corymbs somewhat lax with only 1–6 heads; bracts about 20, linear, acuminate, scarious on the margins; ligules 5–7-nerved.....5. *Lawsoni*.

Ray-flowers ♀ without pappus to the achenes, usually sterile, disk-flowers with pappus, fertile; heads with bracteoles below the involucre and on the pedicels:—

Leaves not white and cottony beneath:—

Leaves entire, serrate, often deeply, but not pinnatifid:—

Basal leaves petioled, oblanceolate or spatulate, cauline sessile, lanceolate from an amplexicaul base, all regularly shortly dentate, glabrous, 2–3.5 in. long, .5 in. broad; heads small, .5 in. broad, the ligules about

7-nerved; bracts narrow, glabrous; achenes striate, glabrous; pappus sordid.....6. *Wightii*.

Basal leaves almost rosulate, large, cauline small; all leaves sessile, elliptic-oblong or oblanceolate, crenate, strigosely villous, with 3—7 prominent oblique nerves, up to 3 in. long, 1 in. broad; heads .5—7 in. broad, the ligules about 6-nerved; bracts narrow, glabrous except the tip; achenes striate, glabrous; pappus yellow.....7. *polycephalus*.

Leaves all cauline, uppermost only smaller, lower dense on stem, sessile, hispid-pubescent, elliptic or oblong, deeply serrate, base auricled and amplexicaul, up to 2 in. long, .7 in. broad, nerves oblique but not prominent; heads .6—8 in. broad, the ligules broad, 9-nerved; bracts narrow, acuminate, hispid; achenes very villous; pappus rufous.

8. *Lessingianus*.

Leaves pinnatifid:—

Leaves lyrate, with broadly ovate or orbicular end lobe, smaller lower lobes and broadly auricled basal one, all lobulate, hispid-pubescent, about 2.5 in. long, 1.5 in. broad; heads .5 in. broad, the ligules 4-nerved; bracts narrow, acuminate, glabrous or crispate; achenes all similar, 5-angled, nearly glabrous; pappus sordid.....9. *ludens*.

Leaves deeply pinnatifid or bipinnatifid with narrow segments; achenes of ray flowers sterile, glabrous or slightly villous, of disk-flowers hispid or villous:—

Leaves deeply pinnatifid with about 3 pairs of mucronate side lobes, rarely over 1 in. long, usually thickly crispate-hispid, margins reflexed; heads .8 in. broad, the 8 ligules 4-nerved; bracts 10—15, lanceolate, acuminate, crispate-hispid; pappus yellow

10. *Hohenackeri*.

Leaves pinnatifid or bipinnatifid with many lobes not mucronate, up to 2 in. long, glabrous or nearly so, margins often reflexed; heads small, about .4 in. broad, the 6—10 ligules 4-nerved; bracts about 12, obovate, cuspidate, glabrous except the ciliate tips; pappus yellowish.

11. *tenuifolius*.

Leaves white beneath with cottony tomentum:—

Leaves pale and cottony above, densely white-tomentose beneath, rhomboid or ovate-lanceolate irregularly toothed, the petiole auricled, up to 2 in. long, .75 in. broad; heads nearly 1 in. in diam., the ligules about 12, long and narrow, 4-nerved; bracts 20 or more, lanceolate, acuminate, scarious on the margins; achenes angled, shortly pilose; pappus soft, white.

12. *Edgeworthii*.

Leaves glabrous above, cottony beneath, linear-oblong, the margins recurved, up to 2 in. long, .25 in. broad; heads about .5 in. in diam., the ligules 10—15, narrow, 4-nerved; bracts 10—20, narrow, hardened, back strigosely villous; achenes small, scabrid-villous; pappus white, rigid, feathery.....13. *Dalzellii*.

Climbing shrubs or undershrubs; achenes with pappus:—

No ligulate flowers, all ♂; leaves orbicular or ovate, cordate, 3—5-ribbed from the base:—

Leaves pubescent and slightly cottony when young, afterwards glabrous, rather abruptly acuminate at apex; heads .4 in. long, with about 9—12 flowers; bracts 8, linear-obovate, nearly glabrous, the apex ciliate.....14. *Walkerii*.

Leaves densely cinnamomeous-tomentose beneath, gradually acuminate at apex; heads .5 in. long with about 5—15 flowers; bracts 8, oblong-lanceolate, cottony on the back.....15. *corymbosus*.

Ligulate flowers present; ligules yellow:—

Leaves long-petioled, membranous, ovate, cordate, sinuate-dentate, glabrous above, densely white cottony tomentose beneath, 5—7-ribbed; heads large, about 1 in. in diam., ligules obovate, 5-nerved; bracts many, unequal, membranous, densely white-cottony on the back; achenes oblong, ribbed

16. *calcadensis*.

Leaves with hastate or cordate terminal leaflets, base with reniform stipulate auricles, sometimes a few small intermediate lobes; stems angled and flexuose,

even zigzag; heads yellow, in terminal and axillary divaricately branched corymbs; achenes of ♂ flowers linear, 4—5-ribbed, scabrid on the ribs:—

Stem, leaves and inflorescence, including bracts, white-cottony tomentose; leaves up to 3.5 in. long, 1 in. broad, coriaceous, dentate, the auricle large and rounded; heads .5 in. in diam., many-flowered; achenes of ♂ flowers broadly oblong, glabrous but ciliate, deeply 2—3-furrowed on back, the inner face with a bifid rib.....17. *candicans*.

Stem, leaves and inflorescence, including bracts, glabrous or nearly so; achenes of ♀ flowers flattened, narrow, the inner face with a slight rib, nearly glabrous:—

Leaves ovate, dentate, membranous, slightly crispate-villous beneath, up to 4 in. long, 2 in. broad, the auricle large, rounded; heads .5 in. in diam., many-flowered; ligules about 12.....18. *intermedius*.

Leaves lanceolate or ovate, dentate, membranous, up to 3 in. long, 1 in. broad, the auricle minute or absent; heads .3 in. in diam., few-flowered; ligules about 8.....19. *Wightianus*.

1. *SENECIO NUDICAULIS*, Buch.-Ham. in Don Prodr. 179; F. B. I. iii. 340.
Hills of N. Circars from Ganjam to the Godavari, above 3,000 ft.
(W. Elliot, Gamble).
A scapigerous "Ragwort."
2. *SENECIO ZEYLANICUS*, DC.; F. B. I. iii. 340.
W. Gháts, in the Pulney Hills and hills of Travancore, in wet places above 5,000 ft.
A slender very narrowly-leaved herb.
3. *SENECIO NEELGHERYANUS*, DC. in Wt. Contrib. 23; F. B. I. 341;
Wt. Ic. t. 1132.
W. Gháts, Nilgiri and Pulney Hills, above 6,000 ft., in Shola forest margins.
The Nilgiri "Ragwort." A Kundahs form has the leaves very white cottony beneath.
4. *SENECIO LAVANDULAEFOLIUS*, DC. in Wt. Contrib. 23; F. B. I. iii. 343; Wt. Ic. t. 1133.
W. Gháts, Nilgiri and Pulney Hills, above 6,000 ft., on the downs.
An erect single-stemmed herb, about 6 in. to 1 ft. high, the closely set leaves giving the stem a spindle shape.
5. *SENECIO LAWSONI*, Gamble in Kew Bull. 1920, 342.
W. Gháts, Nilgiri Kundahs about 7,500 ft., on grassy downs between Avalanché and Sispara (Lawson, Gamble).
A very slender herb about 12—15 in. high.
6. *SENECIO WIGHTII*, Benth. *S. saxatilis*, Hook. f.; F. B. I. iii. 344, not of Wall. *Doronicum Wightii*, DC.; Wt. Ic. t. 1124.
W. Gháts, Nilgiri Hills above 6,000 ft. in wet places; Chikanhalli in Mysore, at 3,000 ft. (Meebold).
The swamp Ragwort, the heads in long-peduncled lax corymbs.
7. *SENECIO POLYCEPHALUS*, C. B. Clarke; F. B. I. iii. 344. *Doronicum Arnottii*, DC.; Wt. Ic. t. 1125.
W. Gháts, Nilgiri Hills, above 6,000 ft., on the downs.
A pretty species with scapose habit and rather few heads.
8. *SENECIO LESSINGIANUS*, C. B. Clarke; F. B. I. iii. 344. *Doronicum Lessingianum*, W. & A.; Wt. Ic. t. 1126.
W. Gháts, Nilgiri Hills, above 6,000 ft.
A handsome species with leafy stems and few large heads on long peduncles.

9. *SENECIO LUDENS*, C. B. Clarke; F. B. I. iii. 345.
 Bababudan Hills of Mysore at 5,000 ft., usually in damp places;
 hills of Travancore and Tinnevely in grass land.
 A slender erect herb, with bright yellow flowers in few-flowered
 corymbs.
10. *SENECIO HOHENACKERI*, Hook. f.; F. B. I. iii. 345. *Doronicum*
Candolleianum, W. & A.; Wt. Ic. t. 1127.
 W. Gháts, Nilgiri Hills at 5,000—7,000 ft., on open downs.
 A branching small undershrub up to about 18 in. high with
 woody rootstock.
 Var. *rupestris*, Gamble. *Doronicum rupestre*, Wt. Ic. t. 1128.
 Sivagiri Hills of Tinnevely, in clefts of rocks.
 A smaller plant with narrower less hispid leaves and larger
 flower-heads and ligules.
11. *SENECIO TENUIFOLIUS*, Burm. f. Fl. Ind. 181 t. 60, fig. 4; F. B. I.
 iii. 345. *Doronicum tenuifolium*, Wt. Ic. t. 1129.
 Deccan and Carnatic, in most dry Districts south of the Kistna,
 westwards to the E. slopes of the Gháts, up to 5,000 ft.
 A slender much-branched annual with leaves cut into very
 narrow lobes, the achenes white-villous.
12. *SENECIO EDGEWORTHII*, Hook. f.; F. B. I. iii. 346. *Doronicum*
tomentosum, Wt. Ic. t. 1151 A.
 W. Deccan, hills of N. Coimbatore at 4,000—5,000 ft.; W. Gháts
 from S. Canara to Wynaad and W. Nilgiris, at 5,000 ft.
 An erect very white undershrub, the corymbs with few heads.
13. *SENECIO DALZELLII*, C. B. Clarke; F. B. I. iii. 346.
 Bababudan hills of Mysore (Law).
 An erect herb with small heads on slender peduncles.
14. *SENECIO WALKERI*, Arn. Pug. 31; Wt. Ic. t. 1131. *S. araneosus*,
 DC.; F. B. I. iii. 351.
 W. Gháts, Pulney Hills up to 7,000 ft., scarce in Nilgiris.
 A rather slender climber with heads in corymbose clusters on
 the branches of axillary and terminal panicles; flowers reddish (?).
15. *SENECIO CORYMBOSUS*, Wall.; F. B. I. iii. 351; Wt. Ic. t. 1130, Ill.
 t. 115.
 N. Circars, Mahendragiri Hill in Ganjam, at 4,500 ft. (Beddome,
 Gamble); W. Gháts, from the Nilgiris southwards, above
 5,000 ft.
 A stouter plant than the former, to which it is very similar
 except in tomentum.
 Flowers white or yellowish, the heads on terminal branchlets
 often few-flowered and in laxer corymbs.
16. *SENECIO CALCADENSIS*, Ramas, in Rec. Bot. Surv. Ind. vi. 138, t. 1.
 W. Gháts, Calcad Hills of Tinnevely, at about 2,500 ft. (Hooper
 and Ramaswami), in evergreen forest.
 A large climbing shrub with light yellow flowers.
17. *SENECIO CANDICANS*, DC.; F. B. I. iii. 352; Wt. Ic. t. 1134.
 N. Circars, Mahendragiri Hill in Ganjam, at 4,500 ft.; Deccan,

Nandidrúg in Mysore; W. Gháts, Nilgiri Hills, above 4,000 ft. A pretty subshrubby climber, white-woolly and conspicuous; the ♀ achenes very characteristic.

18. *SENECIO INTERMEDIUS*, Wt. Ic. t. 1135. *S. scandens*, Hook. f.; F. B. I. iii. 352, *not of* Buch.-Ham. in D. Don Prod., *in part*.
Deccan, Bababudan Hills of Mysore, hills of N. Coimbatore at 4,000—6,000 ft.; W. Gháts, Nilgiri Hills, in the Kundahs at 7,000 ft.

A pretty climber, subshrubby among bushes, with rather large leaves and prominent auricles.

19. *SENECIO WIGHTIANUS*, DC.; Wt. Ic. t. 1136. *S. scandens*, Hook. f.; F. B. I. iii. 352 *in part*.

W. Gháts, Pulney Hills and hills of Travancore about 4,000 ft.

A slender climber with zig-zag stems and rather small flower-heads, the leaves sometimes pinnate or pinnatifid.

Senecio vulgaris, Linn., the Groundsel, has established itself in gardens and on roadsides in the Nilgiris and will probably spread to other hilly parts of S. India.

51. *Echinops*, Linn.

Thistle-like herbs with white tomentum. *Leaves* alternate, pinnatifid, spinous. *Heads* in globose involucrate clusters, white or blue, sessile or shortly stipitate on a common receptacle, 1-flowered. Flowers ♂, all fertile. *Involucre* oblong; bracts many-seriate, rigid, pungent or some spinescent, outer shorter often hair-like, middle ones spatulate, inner linear or lanceolate, sometimes connate in a tube with 1 rigid spine. *Receptacle* minute. *Corolla*-tube slender, limb with 5 slender lobes. *Anther*-bases sagittate, the auricles connate, tails entire or fimbriate. *Style*-arms thick, with a thick basal ring, at length spreading. *Achenes* elongate, villous; pappus of many short, free or connate, bristles.

ECHINOPS ECHINATUS, DC.; F. B. I. iii. 358.

N. Circars, Deccan and Carnatic, in dry Districts, in fields, grass lands and open forests and on roadsides.

A branched spreading conspicuous annual with spinous heads up to 2 in. in diam., the flowers white, the leaves up to 7 in. long with triangular pinnatifid spinous lobes.

52. *Cnicus*, Linn.

Erect, simple or branching thistles. *Leaves* alternate, often decurrent, serrate or pinnatifid, spinous. *Heads* solitary, peduncled or subsessile, scattered or crowded, homogamous, flowers all ♂ and fertile, rarely dioecious. *Involucre* ovoid hemispheric or globose; bracts many-seriate, appressed, erect spreading or recurved and spinescent, outer foliaceous. *Receptacle* flat or convex, densely bristly. *Corollas* white yellow or red, slenderly tubular, the limb with 5 slender lobes. *Anther*-bases sagittate, the auricles connate, tails slender. *Style*-arms short, obtuse. *Achenes* obovoid, obtusely 4-angled, smooth or 5—10-ribbed, truncate or umbonate at top; pappus copious, feathery, the longer hairs usually clavellate.

CNICUS WALLICHII, Hook. f.; F. B. I. iii. 363. Var. *Wightii*, Hook. f. *Cirsium argyracanthum*, Wt. Ic. t. 1137-8.

W. Gháts, Nilgiri and Pulney Hills and hills of Travancore, above 5,000 ft., on open downs.

A tall thistle with very spinous leaves, glabrous or white-tomentose beneath, bracts with dilated and then spinous tips and pale purple flowers. It may reach a height of 6—7 ft.

53. Goniocaulon, Cass.

An erect glabrous branched annual, stem acutely 4—8-angled. *Leaves* alternate, oblong, serrate, glandular-dotted. *Heads* homogamous, narrow, in fascicles and corymbs; flowers all ♂, fertile. *Involucre* oblong from a narrow base; bracts many-seriate, pale, narrow, rigid, not spinous, the inner elongate, the outer gradually shorter. *Receptacle* very narrow, paleaceous. *Corolla*-tube slender, limb long, cylindric, 5-lobed to the middle or lower, the lobes narrow. *Anther*-bases sagittate, connate, shortly tailed, tips long; filaments hairy. *Style*-arms filiform. *Achenes* glabrous, oblong, subcylindric, about 20-ribbed; pappus paleaceous, the scales many-seriate, oblanceolate, unequal.

GONIOCAULON GLABRUM, Cass.; F. B. I. iii. 377. *Amberboa indica*, Wt. Ic. t. 479.

Deccan and Carnatic, on fallow fields and black cotton soil, often gregarious and simulating a cultivated crop.

An erect annual with rose-coloured flowers and oblong leaves.

54. Tricholepis, DC.

Annual or perennial branched herbs. *Leaves* alternate, entire toothed or sublyrate, often punctate. *Heads* terminal on the branchlets, homogamous, flowers all ♂, fertile. *Involucre* ovoid; bracts many-seriate, very narrow, imbricate, the outer gradually shorter, all aristate-acuminate or the outer mucronate, spreading or recurved. *Receptacle* flat or convex, densely bristly. *Corollas* yellow red or purple, regular or slightly oblique; tube slender, limb 5-lobed to the middle. *Anther*-bases sagittate, the auricles connate, tails slender, lacerate; filaments papillose-hairy. *Style*-arms slender. *Achenes* oblong or obovoid, smooth, ribbed, the basal areole lateral and hollowed; pappus of stiff, paleaceous or feathery, very unequal scales or 0.

Pappus-scales many, achenes oblong:—

Stems prominently leafy; basal leaves obovate, cauline oblong, sometimes spatulate, all coarsely toothed, the teeth mucronate, the bases semi-amplexicaul, up to 2.5 in. long, 1 in. broad; pappus scales subpaleaceous, serrulate...1. *radicans*.
Stems sparsely leafy; leaves all linear-oblong, shortly mucronate-serrate, the bases auricled, up to 4 in. long, .5 in. broad; pappus scales soft feathery

2. *glaberrima*.

Pappus-scales few, minute or 0; achenes ovoid or oblong with circular apical areole; leaves distant except at base, linear-oblong or lanceolate, the basal spatulate, sharply mucronate-serrate, up to 3 in. long, the lower to 1 in. broad, the cauline very narrow...3. *angustifolia*.

Pappus-scales 0; achenes obovoid with only a small apical areole; stems leafy, leaves oblong, semi-amplexicaul and auricled at base, shortly sharply serrate, up to 5 in. long, 1.5 in. broad...4. *amplexicaulis*.

1. *TRICHOLEPIS RADICANS*, DC.; F. B. I. iii. 381.
Deccan and Carnatic, up to 3,500 ft. in the hills, on fallow fields and in open forest land.
A slender branching herb with purple flowers and angular stem.
2. *TRICHOLEPIS GLABERRIMA*, DC.; F. B. I. iii. 381.
W. Gháts, in S. Canara, Coorg and the hills of Mysore.
An erect glabrous herb with purple flowers and angular stem.
3. *TRICHOLEPIS ANGUSTIFOLIA*, DC.; F. B. I. iii. 382.
W. Coast, in S. Canara, Malabar and Travancore.
An erect herb with long slender angular branches and pink flowers in solitary heads.
4. *TRICHOLEPIS AMPLEXICAULIS*, C. B. Clarke; F. B. I. iii. 381.
W. Coast in Canara (South ?) (Law).
A tall erect leafy herb reaching 5 ft. in height with purple flowers in many heads, the stems ribbed and sometimes scaberrulous.

55. *Volutarella*, Cass.

Annual herbs, dichotomously branched. *Leaves* alternate, entire toothed or pinnatifid. *Heads* subsolitary, heterogamous; outer flowers 1-seriate, neuter; disk-flowers ♂, fertile. *Involucre* ovoid or globose; bracts many-seriate, the innermost narrow, acute, the outer shorter, awned or spinescent. *Receptacle* flat, densely bristly. *Corollas* regular, purple violet or blue; tube slender, limb cylindric, deeply 5-lobed. *Anther*-tails sagittate, the auricles connate, shortly tailed. *Style*-arms free or connate, hairy below them. *Achenes* obovoid or oblong, subterete or angled, ribbed, often pitted between the ribs, the basal areole oblique or lateral; pappus of many unequal bristles, the innermost 2—4 long, dilated and flattened, the outer gradually shorter.

VOLUTARELLA DIVARICATA, Benth.; F. B. I. iii. 383. *Tricholepis procumbens*, Wt. Ic. t. 1139.

Circars, Deccan and Carnatic, up to 2,000 ft., on dry stony ground and sandy river banks.

A stiff straggling herb with pale purple flowers and usually oblong or obovate pinnatifid undulately lobed leaves. The spinous bracts are rather troublesome.

Carthamus tinctorius, Linn., the Safflower, is not much cultivated in Madras, but is found here and there, especially on black cotton soil. The corollas of the flowers are used as a dye for silks and the achenes give an oil. Vern. *Hind.* Kusam; *Tel.* Kusamba; *Tam.* Sendurkem.

56. *Dicoma*, Cass.

Herbs or low shrubs. *Leaves* alternate. *Heads* subsessile on the branches or in the axils of the upper leaves, or leaf-opposed, rarely corymbose; homogamous and discoid with all the flowers ♂ or heterogamous with the outer flowers ♀, all fertile or the innermost sterile. *Involucre* globose conic or subcampanulate; bracts many-seriate, imbric-

cate, ovate lanceolate or linear, acuminate or spinescent, outer shorter. *Receptacle* flat, naked, often pitted. *Corollas* of ♀ flowers, if present, slender, subligulate, of ♂ flowers tubular, the limb 5-lobed, the lobes erect or revolute. *Anther*-bases sagittate, tails long, more or less bearded. *Style*-arms short, erect, obtuse. *Achenes* turbinate, densely silky-villous, 5—10-ribbed; *pappus*-hairs many-seriate, feathery, the inner or all flat, the outer paleaceous or of slender bristles.

DICOMA TOMENTOSA, Cass.; F. B. I. iii. 387. *D. lanuginosa*, DC.; Wt. Ic. t. 1140.

Deccan and Carnatic, on gravelly soils and laterite, in dry country. An erect branching undershrub with white or pale yellow corollas, the leaves soft, linear or linear-obovate, densely white-tomentose, the heads subaxillary, spinescent.

57. *Picris*, Linn.

Erect branched hispid herbs. *Leaves* alternate or radical, entire toothed or pinnatifid. *Heads* terminal on the branches of a corymb or solitary, long-peduncled, homogamous. *Involucre* suburceolate or campanulate; inner bracts 1-seriate, subequal, outer many-seriate, herbaceous, or the outermost broad and foliaceous. *Receptacle* flat, naked. *Corollas* yellow, ligules truncate, 5-toothed. *Anther*-bases sagittate, acute or shortly setaceous. *Style*-arms slender. *Achenes* narrow, incurved, glabrous, compressed or angled, 5—10-ribbed, the spaces between the ribs transversely barred, all similar or the outer with a shorter point and obsolete pappus; pappus usually copious, with one series of feathery soft hairs.

PICRIS HIERACIODES, Linn.; F. B. I. iii. 393; Wt. Ic. t. 1143.

W. Ghâts, Nilgiri and Pulney Hills, above 5,000 ft.

An erect coarse herb reaching 4 ft. in height, with rough hispid stem, spatulate petioled base and oblong sessile cauline leaves, the bracts with stiff black hairs down the midrib.

58. *Hypochaeris*, Linn.

Annual or perennial scapigerous herbs. *Leaves* rosulate, entire toothed or pinnatifid. *Heads* long-peduncled, solitary, homogamous. *Involucre* subcampanulate; bracts many-seriate, appressed, unequal, the outer shorter. *Receptacle* flat; paleae narrow, usually hyaline. *Corollas* yellow, ligules truncate, 5-toothed. *Anther*-bases sagittate, auricles acuminate. *Style*-arms slender, slightly obtuse. *Achenes* of two kinds, the outer truncate at tip, not beaked, the inner fusiform and long-beaked, all 10-ribbed and transversely barred between the ribs; pappus feathery, 1-seriate with a few shorter outer hairs.

HYPOCHAEERIS GLABRA, Linn.; F. B. I. iii. 401.

W. Ghâts, Nilgiri and Pulney Hills above 6,000 ft., an introduced European species now run wild; Devicolam, Travancore, 4,500 ft. (K. Venkoba Row).

A scapigerous herb with many slender flowering stems and rosettes of oblong or pinnatifid leaves reaching 6 in. long.

59. *Crepis*, Linn.

Annual or perennial herbs. *Leaves* radical or alternate, cauline often amplexicaul, entire toothed or pinnatifid. *Heads* peduncled, solitary fascicled or corymbose, homogamous. *Involucre* cylindric or campanulate; bracts either many-seriate and imbricate, or 1-seriate with some shorter and outer, base or midrib sometimes thickened after flowering. *Receptacle* flat, naked or shortly fimbriate. *Corollas* yellow or red; ligules truncate, 5-toothed. *Anther*-bases sagittate, auricles acute. *Style*-arms slender. *Achenes* more or less fusiform or oblong, rarely short and cylindric, ribbed, glabrous or scaberulous, the tip narrowed or beaked; pappus copious, short or long, of simple, soft silvery, rarely brownish and stiff, hairs.

Heads very small, scarcely .2 in. long, few-, about 14-flowered, in slender nearly leafless corymbs from a rosulate base; leaves membranous, petioled, obovate, sinuate-toothed or runcinate-pinnatifid, up to 7 in. long; inner bracts lanceolate acuminate, the midrib thickened in fruit, outer minute; achenes very small, fusiform, ribbed, scaberulous, very shortly beaked.....1. *japonica*. *Heads* about .3 in. long, about 14-flowered in slender scanty corymbs; leaves membranous, both basal and cauline, oblanceolate, acuminate, sinuate-toothed, up to 6 in. long; inner bracts linear, glabrous, the midrib not enlarged in fruit, outer short; achenes narrowly fusiform, ribbed, scaberulous, shortly beaked, 1 or 2 outer more slender and with longer beaks.....2. *fuscipappa*. *Heads* .5 in. long, few-, about 12-flowered, in almost leafless scapes from a rosulate base; leaves thick, linear-lanceolate or oblong, entire or shortly-toothed, narrow, up to 12 in. long; inner bracts few, linear, membranous, outer short, ovate; achenes fusiform, ribbed, glabrous, very shortly beaked.....3. *acaulis*.

1. *CREPIS JAPONICA*, Benth.; F. B. I. iii. 395. *Youngia napifolia*, Wt. Ic. t. 1147.
N. Circars, hills of Ganjam; W. Gháts, Nilgiris, Pulneys and hills of Travancore and Tinnevely above 5,000 ft.
A very slender annual with minute yellow flowers.
2. *CREPIS FUSCIPAPPA*, Benth.; F. B. I. iii. 395.
W. Gháts, Avalanché and Sispara, Nilgiris, about 7,000 ft (Lawson, Gamble).
A slender annual with yellow flowers and long-acuminate leaves.
3. *CREPIS ACAULIS*, Hook. f.; F. B. I. iii. 396. *Microrhynchus glabra*, Wt. Ic. t. 1145.
N. Circars, hills of Ganjam, up to 4,500 ft. on Mahendragiri (Fischer and Gage); W. Gháts, Nilgiri and Pulney Hills, at various levels.
A scapigerous perennial with yellow flowers in cylindric heads.

60. *Lactuca*, Linn.

Glabrous or hispid milky herbs. *Leaves* radical and alternate, entire toothed pinnatifid or pinnate, cauline often amplexicaul and auricled. *Heads* homogamous, sessile or peduncled, panicled corymbose racemose or spicate. *Involucre* cylindric, usually narrow; bracts usually few-seriate, thinly herbaceous, the inner clongate, the outer short. *Receptacle* flat, naked. *Corollas* yellow pink or blue; ligules truncate, 5-toothed at apex. *Anther*-bases sagittate, auricles acute or setaceous. *Style*-arms slender. *Achenes* ovoid-oblong or narrow, compressed or

flattened, beaked; the faces ribbed, smooth or rugose; beak slender or short and cylindric, dilated into the pappiferous disk; pappus copious, the hairs very slender and usually soft and white, sometimes with a minute outer ring.

Glabrous herb with mostly radical leaves and heads in spikes or racemes on the long erect almost naked branches of the flowering stems; leaves runcinate-pinnatifid, the lobes deflexed, margins minutely spinulose-serrate, up to 12 in. long; achenes black, fusiform, ribbed, the ribs muriculate, the beak ending in a cup-shaped disk

1. *runcinata*.

Glabrous or hispid herb with chiefly cauline leaves and heads in terminal paniculate racemes; leaves polymorphous but usually pinnatifid with a large hastate terminal lobe, the petiole slender or winged and auricled at base; achenes dark brown, flattened, 3-ribbed on either side, the beak ending in a flattened disk...2. *hastata*.

1. *LACTUCA RUNCINATA*, DC. in Wt. Contrib. 26. *L. Heyneana*, DC.; F. B. I. iii. 403. *Brachyramphus Heyneanus*, Wt. Ic. t. 1146.

Most plains Districts, in fields and hedges and on old walls and among rocks.

A tall glabrous herb with pinkish-white flowers.

2. *LACTUCA HASTATA*, DC.; F. B. I. iii. 407. *Mulgedium neilgheryense*, Wt. Ic. t. 1144.

W. Gháts, Nilgiri Hills, about 7,000 ft., in open spots in Shola forest.

A tall herb with bluish-purple flowers.

Lactuca sativa, Linn., the Lettuce, is regularly cultivated as a vegetable and salad plant. Vern. *Hind*. Kahir, *Salád*.

Taraxacum officinale, Wigg.; F. B. I. iii. 401, the Dandelion, is found as a weed both in Nilgiris and Pulneys, but so far is not very common, though likely to spread.

61. *Sonchus*, Linn.

Annual or perennial milky herbs. *Leaves* radical or alternate, the cauline often amplexicaul and auricled, entire toothed or pinnatifid, margins usually spinulose-toothed. *Heads* homogamous, terminal, sub-corymbose umbellate or paniced. *Involucre* ovoid campanulate or cylindric, often thickened at the base; bracts many-seriate, herbaceous, the outer smaller. *Receptacle* flat, naked. *Corollas* yellow, the ligules truncate and 5-toothed at apex. *Anther-bases* sagittate, auricles setaceous-acuminate. *Style-arms* slender. *Achenes* ovoid obovoid or ellipsoid, more or less compressed, ribbed, slightly contracted at base and apex but not beaked, smooth or transversely rugose; pappus copious, many-seriate, the hairs white, soft and silky, united at base in a deciduous ring.

Annual; leaves with acute spreading auricles, usually runcinate-pinnatifid; bracts glabrous or nearly so; achenes obovoid, ribbed, transversely muriculate

1. *oleraceus*.

Perennial; leaves with obtuse appressed auricles, usually oblong or oblanceolate, shortly pinnatifid; bracts glandular-hispid; achenes oblong, narrow, ribbed and transversely rugose.....2. *arvensis*.

1. *SONCHUS OLERACEUS*, Linn.; F. B. I. iii. 414. *S. ciliatus*, Lam.; Wt. Ic. t. 1141.

Most Districts, especially in the hills and up to 8,000 ft., on roadsides, in gardens and cultivated lands, probably an introduction.

A fleshy milky herb.

2. *SONCHUS ARVENSIS*, Linn.; F. B. I. iii. 414. *S. Wightianus*, DC.; Wt. Ic. t. 1142.

Hilly Districts, occasional, in cultivated lands, probably an introduction.

A tall perennial, the leaves mostly radical.

62. *Launaea*, Cass.

Perennial glabrous herbs, usually with yellow juice. *Leaves* chiefly radical, sinuate-lobed or pinnatifid, the margins often with cartilaginous or subspinous teeth. *Heads* homogamous, peduncled or subsessile, solitary fascicled racemose or paniculate. *Involucre* campanulate or cylindric; bracts many-seriate, herbaceous, often with scarious margins, the innermost subequal, the outer gradually shorter. *Receptacle* flat, naked. *Corollas* yellow, the ligules truncate and 5-toothed at apex. *Anther*-bases sagittate, the auricles acute or shortly setaceous. *Style*-arms slender. *Achenes* narrow, subterete angled or slightly flattened, rarely winged, truncate at both ends or rarely emarginate; ribs 4—5, stout, close-set, smooth papillose or narrowly winged; pappus copious, of simple very slender white many-seriate hairs, connate at base in a deciduous ring.

Stems and branches not rooting at the nodes; heads more or less racemose, solitary or fascicled on the flowering stem; leaves obovate-oblong, pinnatifid with rounded or obtuse segments, up to about 4 in. long, 1.5 in. broad, the margins with cartilaginous teeth; achenes columnar, thickly ribbed, smooth.....1. *nudicaulis*.
Stems and branches long, flagelliform, leaf-bearing and rooting at the nodes; heads solitary or fascicled at the nodes; leaves oblong, runcinate-pinnatifid or sinuate-lobed, up to 3 in. long, .5 in. broad, the teeth often white and cartilaginous; achenes pale, obtrusely 4-gonous.....2. *pinnatifida*.

1. *LAUNAEA NUDICAULIS*, Less.; F. B. I. iii. 416.

Deccan and Carnatic, in hot dry Districts as Bellary (Rangachari), Palamcottah in Tinnevely (Wight).

A perennial scapigerous herb.

2. *LAUNAEA PINNATIFIDA*, Cass.; F. B. I. iii. 416. *Microhynchus sarmentosus*, Wt. Ill. t. 133.

E. and W. Coasts, on sandy sea-shores.

A trailing plant, useful as a sandbinder (cf. Clegh. Madr. Journ. i. t. 5), though rather weak.

Besides the many introduced plants which have been described or mentioned as having practically become part of the Flora of S. India, there are many others which are cultivated in gardens and in some cases have run wild in their neighbourhood. Few gardens in the plains are without some of the species of *Helianthus*, *Zinnia*, *Coreopsis*, *Tagetes*, *Gaillardia*, *Chrysanthemum*, *Calendula*; *Callistephus* and *Dahlia* of various colours may be seen in and about the hill stations running wild on the slopes. Many others that have been introduced and grown might be mentioned. There are some species of Compo-

sitae that are grown occasionally as vegetables, besides those that have been already mentioned. Among them would come *Helianthus tuberosus*, Linn., the Jerusalem Artichoke, etc.

Family LXXXVII. GOODENIACEAE.

Herbs or shrubs, juice not milky. *Leaves* alternate or radical, rarely opposite; stipules 0. *Flowers* hermaphrodite, regular or irregular, axillary or terminal, solitary or in spikes, racemes or panicles. *Calyx*-tube adnate to the ovary or rarely free; limb 5-lobed or nearly obsolete. *Corolla*-lobes 5, valvate in bud. *Stamens* 5, alternate with the corolla-lobes, inserted at the base of the corolla. *Ovary* 1—2-celled; ovules in each cell 1 or many, on the dissepiment; style simple with a cup-shaped sheath including the stigma. *Fruit* a drupe or capsule. *Seeds* albuminous, embryo straight, radicle inferior.

Scaevola, Linn.

Herbs or shrubs. *Leaves* simple, entire or toothed. *Flowers* axillary, solitary or in dichotomously branched cymes, sessile or pedicellate. *Calyx*-tube adnate to the ovary; limb usually short, annular or 5-lobed, sometimes 0. *Corolla* oblique, split at the back to the base; lobes subequal, at length digitately spreading. *Stamens* free. *Ovary* 2-celled; ovules 1—2, erect, sheath cupular; stigma truncate or divaricately 2-lobed. *Fruit* an indehiscent drupe; exocarp thin or fleshy; endocarp hard and woody, rarely crustaceous. *Seeds* solitary. *Calyx*-lobes conspicuous, nearly equal to the ovary; drupe white; leaves obovate, 4—8 in. long.....1. *frutescens*. *Calyx*-lobes very short, much shorter than the ovary, or the tube truncate; drupe purple; leaves elliptic or obovate, 1.5—3 in. long.....2. *Plumieri*.

1. SCAEVOLA FRUTESCENS, Krause. *S. Koenigii*, Vahl; F. B. I. iii. 421. *S. Taccada*, Roxb.; Wt. Ill. t. 137.

W. Coast, near the sea.

A large shrub with large fleshy leaves, white flowers in axillary cymes and a white somewhat lobed drupe, .75 in. in diam. Vern. Mar. Bhadrak.

2. SCAEVOLA PLUMIERI, Vahl. *S. Lobelia*, Murr.; F. B. I. iii. 421. *S. uvifera*, Stocks; Wt. Ic. t. 1613.

Sea coast near Tuticorin in Tinnevely (Wight, Rangachari). A small branching shrub with rather small fleshy leaves, yellowish flowers in small cymes and a smooth purple drupe .5 in. in diam.

Family LXXXVIII. CAMPANULACEAE.

Herbs, undershrubs or shrubs, erect or climbing, often with milky juice. *Leaves* alternate or rarely opposite, entire toothed or rarely lobed; stipules 0. *Flowers* hermaphrodite, rarely unisexual by abortion, axillary or terminal, solitary racemose or paniculate; bracts small, bracteoles usually 0. *Calyx*-tube adnate to the ovary; limb 4—6-partite,

usually persistent. *Corolla* superior, tubular rotate or campanulate, sometimes bilabiate, lobes as many as those of the calyx, valvate. *Stamens* as many as the corolla-lobes and alternate with them, inserted on the epigynous disk or (in *Sphenoclea*) on the corolla-tube; anthers free or united in a tube. *Ovary* 2—5-celled; placentas axile, many-ovuled; style simple, cylindric; stigma-lobes as many as the ovary cells. *Fruit* a capsule or berry, sometimes indehiscent and dry. *Seeds* very many, small, albuminous; testa thin; embryo straight, axial, radicle inferior.

Corolla zygomorphic, 2-lipped; anthers connate:—

Fruit an indehiscent berry.....1. *Pratia*.

Fruit a capsule, 2-valved at the crown.....2. *Lobelia*.

Corolla actinomorphic; anthers free:—

Capsule loculicidally dehiscent within the calyx-teeth; flowers lax:—

Corolla rotate, deeply cleft, with linear lobes; stigma capitate

3. *Cephalostigma*.

Corolla campanulate, the lobes short; stigma lobed.....4. *Wahlenbergia*.

Capsule circumscissile; flowers in a dense cylindric spike.....5. *Sphenoclea*.

Capsule dehiscent at the base or sides below the calyx-teeth; corolla campanulate; stigma lobed.....6. *Campanula*.

1. *Pratia*, Gaud.

Herbs. *Leaves* alternate, toothed. *Flowers* solitary, axillary, peduncled. *Calyx*-limb 5-lobed. *Corolla* oblique, 2-lipped, the upper lip 2-partite, the lower 3-lobed. *Staminal tube* free or nearly so; anthers connate, the 2 lower with terminal bristles. *Ovary* inferior, 2-celled; placentas hemispheric; stigma 2-lobed or emarginate. *Fruit* ellipsoid, indehiscent, crowned with the calyx-lobes. *Seeds* very many, minute.

PRATIA BEGONIFOLIA, Lindl.; F. B. I. iii. 422.

W. Ghâts, Shernbaganur, Madura, at 6,000 ft. (Saulière).

A small trailing and rooting herb with ovate cordate leaves about 5 in. long, a corolla green marked with pink and a soft black ellipsoid berry.

2. *Lobelia*, Linn.

Herbs of various sizes, from very small to large and tall, or undershrubs. *Leaves* alternate, usually toothed. *Flowers* on axillary, 1-flowered, sometimes subracemose peduncles; bracts leafy; bracteoles small or 0. *Calyx* superior; limb 5-partite. *Corolla* oblique, 2-lipped, the upper 2-partite, the lower 3-lobed. *Staminal-tube* free or nearly so; anthers connate, 2 or all penicillate at the apex. *Ovary* inferior, 2-celled; placentas hemispheric; stigma shortly bifid. *Fruit* a loculicidally 2-valved capsule within the calyx-teeth. *Seeds* very many, minute, ellipsoid, compressed or trigonous.

Small herbs with small flowers:—

Seeds trigonous; anthers all penicillate at tip; leaves ovate, denticulate, subsessile, glabrous.....1. *trigona*.

Seeds not trigonous; two anthers only penicillate at tip:—

Seeds compressed; leaves ovate or elliptic, subsessile, obtuse and then narrowed at base, dentate.....2. *trialata*.

Seeds ovoid; leaves oblong or rhomboid, narrowed at base, crenate, sessile and subdecurent.....3. *zeylanica*.

Tall erect herbs with large flowers; anthers with few long hairs at tip:—

Leaves glabrous or nearly so, thin; racemes pubescent; anthers more or less villous on the back.....4. *nicotianaefolia*.
Leaves softly villous, thick; racemes softly villous; anthers glabrous on the back
5. *excelsa*.

1. *LOBELIA TRIGONA*, Roxb.; F. B. I. iii. 423; Wt. Ic. t. 1170.

All plains Districts, in wet places, also in the Hills, common.

A glabrous annual, up to about 1 ft. high, rooting near the base and often prostrate, with pale blue or violet flowers.

2. *LOBELIA TRIALATA*, Buch.-Ham.; F. B. I. iii. 425.

Hills of the N. Circars, Deccan and W. Gháts, above 3,000 ft., less common in plains.

A glabrous annual, up to 15 in. high, with winged stems and pale blue flowers.

3. *LOBELIA ZEYLANICA*, Linn.; F. B. I. iii. 425.

Deccan, in Mysore (Meebold); W. Gháts, in the Anamalais and hills of Travancore.

An erect or more or less prostrate herb with scattered hairs on the leaves and bluish flowers, rather large.

4. *LOBELIA NICOTIANAEOFOLIA*, Heyne; F. B. I. iii. 427; Wt. Ill. t. 135.

W. Gháts, in all Districts, at 3,000—7,000 ft.

A large perennial or biennial herb reaching 5—12 ft. high, the stems hollow, the inflorescence a long cylindric raceme with large white flowers, tinged with lilac.

Var. *trichandra*, C. B. Clarke. *L. trichandra*, Wt. Ic. t. 1171. More slender, more branching and lax, the anthers with white hairs on their backs.

W. Gháts, Nilgiris to hills of Tinnevely, at about 3,000—4,000 ft.

5. *LOBELIA EXCELSA*, Lesch.; F. B. I. iii. 427; Wt. Ic. tt. 1173—4. *L. aromatica*, Moon; Wt. Ic. t. 1172.

W. Gháts, Nilgiris, Pulneys and hills of Travancore, above 6,000 ft.

A large usually biennial herb, similar to the last but with a much denser raceme of flowers, which are pale yellow tinged with purple, the leaves thick and softly tawny-villous.

3. *Cephalostigma*, A. DC.

Slender erect annual herbs, often hispidly hairy. *Leaves* alternate, subsessile, the margin thickened, entire waved or crisped. *Flowers* very small, in lax racemes or panicles; pedicels filiform; bracts very small. *Calyx* superior; limb 5-partite. *Corolla* deeply 5-fid; lobes linear lanceolate, usually blue or whitish. *Stamens* 5, free from the corolla; filaments dilated at the base; anthers free. *Ovary* inferior, subglobose, 2—3-celled; style cylindric; stigma shortly obtusely 3-lobed. *Fruit* a loculicidally 2—3-valved capsule, opening within the persistent calyx-teeth. *Seeds* very many, small, ellipsoid, compressed or trigonous.

Seeds oblong-ellipsoid, compressed; capsule hispid:—

Stem erect, up to 16 in. long, with few branches, occasionally with many from near the base; leaves oblong, acute, undulate, distantly mucronate-dentate;

flowers in short lax leafy cymes at the ends of the branches, pedicels about .5 in. long.....1. *Schimperi*.
 Stem flexuose, up to 8 in. long, dichotomously branched; leaves ovate, distantly mucronate-dentate; flowers in lax leafy cymes from the stems, pedicels about .75 in. long.....2. *flexuosum*.
 Seeds trigonous; capsule glabrous; stem erect, short, bearing dichotomous cymes from the leafy nodes; leaves ovate-oblong, crenate and mucronate in the crenatures; cymes nearly naked, pedicels up to nearly 1 in. long.....3. *Hookeri*.

1. CEPHALOSTIGMA SCHIMPERI, Hochst.; F. B. I. iii. 428. *Wahlenbergia perotifolia*, W. & A. 405; Wt. Ic. t. 842.

N. Circars, Deccan and W. Gháts, in hilly country, up to 5,000 ft., usually in shady places or among rocks, sometimes in open sandy lands.

A slender annual with bluish flowers, usually erect and little branched, but sometimes much branched when growing in open places.

2. CEPHALOSTIGMA FLEXUOSUM, Hook. f. & Th.; F. B. I. iii. 428. Deccan, Bababudan Hills of Mysore (Law), hills of N. Coimbatore at 3,700 ft. (Fischer), Ramandrúg in Bellary (Lawson). A slender annual with yellow flowers (Lawson).

3. CEPHALOSTIGMA HOOKERI, C. B. Clarke; F. B. I. iii. 429. W. Gháts, Kumili in Travancore at 3,000 ft. (Meebold). A slender herb with blue flowers.

4. *Wahlenbergia*, Schrad.

Annual or perennial herbs. *Leaves* alternate or opposite. *Flowers* on terminal or leaf-opposed peduncles, solitary or paniced; bracts minute. *Calyx* superior, limb 5-partite. *Corolla* campanulate, 5-lobed, sometimes to near the base. *Stamens* 5, free from the corolla; filaments often dilated near the base; anthers oblong, free. *Ovary* turbinate, 2—3-celled; style cylindric; stigma 2—5-, usually 3-lobed. *Fruit* a capsule, loculicidally 2—3-valved within the persistent calyx-teeth. *Seeds* very many, minute.

WAHLENBERGIA GRACILIS, Schrad.; F. B. I. iii. 429. *W. agrestis*, A. DC.; Wt. Ic. t. 1175.

W. Gháts, Nilgiris and Pulneys, up to 7,000 ft.

An erect perennial herb with blue flowers on long peduncles and linear leaves.

5. *Sphenoclea*, Gaertn.

An erect annual glabrous marsh herb. *Leaves* alternate, lanceolate, entire. *Flowers* small, sessile, in dense terminal or leaf-opposed peduncled spikes, each with 1 bract and 2 bracteoles. *Calyx*-tube adnate to the ovary, hemispheric; limb 5-lobed, the lobes ovate. *Corolla* campanulate, 5-lobed, the lobes valvate. *Stamens* 5, on the base of the corolla; filaments shortly dilated at base; anthers short, free. *Ovary* semi-inferior, 2-celled; ovules many, on axile placentas; style short; stigma obscurely 2-lobed. *Fruit* a membranous depressed-globose capsule circumsciss at the margin of the calyx-tube, the crown and calyx-lobes deciduous. *Seeds* very numerous, minute, oblong.

SPHENOCLEA ZEYLANICA, Gaertn. ; F. B. I. iii. 438. *S. Pongatium*, A. DC. ; Wt. III. t. 138.

Most Districts, in swampy places, especially near the coast.

A stout herb reaching 1—3 ft. in height with oblong-lanceolate, glaucous green leaves up to 3 in. long and greenish-yellow flowers in close spikes.

6. *Campanula*, Linn.

Perennial or annual herbs, erect or decumbent. *Leaves* alternate or the radical subrosulate. *Flowers* blue purple or white, peduncled or subsessile, terminal or axillary or in a terminal usually pyramidal panicle. *Calyx*-tube adnate to the ovary, turbinate; limb deeply 5-lobed, sometimes with appendages in the sinuses between the lobes. *Corolla* campanulate, more or less deeply 5-lobed. *Stamens* 5, free; filaments dilated at the base; anthers free. *Ovary* inferior, 3- rarely 4—5-celled; ovules numerous in each cell; style cylindric; stigma shortly 3—5-lobed. *Fruit* an obovoid or elongate truncate capsule, dehiscent by small valves at the base or on the sides outside the calyx-lobes. *Seeds* very many, minute, ellipsoid or compressed and margined.

Capsule dehiscent by valves at the base:—

Erect herbs with subrosulate basal leaves and slender straight stems; flowers very small, dimorphic (one form complete, the other without corolla or stamens); capsule small, globose.....1. *canescens*.

Herbs with many branches from a stout rootstock:—

Stems up to 15 in. long, rather stout, softly strigosely villous, leafy, with oblanceolate distantly dentate leaves up to 1 in. long; flowers .5 in. long, the triangular-lanceolate calyx-lobes .2 in. long, dentate.....2. *ramulosa*.

Stems up to 8 in. long, slender, tufted, softly villous; leaves ovate, serrate, the lower ones only over .5 in. long; flowers .2—3 in. long, the triangular toothed calyx-lobes scarcely .1 in. long; corolla and stamens often absent.....3. *Wightii*.

Stems scarcely 6 in. long, many, spreading, wiry, pilose, with very small obovate crenate leaves scarcely .2 in. long; flowers usually solitary at the ends of the branchlets, .4 in. long, the ovate calyx-lobes .1 in. long.....4. *Alphonsii*.

Capsule dehiscent by round pores near the top; erect herbs with rosulate basal leaves and distant cauline ones, all ovate or lanceolate, acute, crenate, petioled; flowers in an interrupted spike or raceme, the calyx-lobes linear; corolla cleft to near the base in narrow lobes.....5. *fulgens*.

1. *CAMPANULA CANESCENS*, Wall. ; F. B. I. iii. 439.

Bababudan Hills of Mysore at 4,000 ft. (Meebold); Hills of Tinnevely (Hooper and Ramaswami).

A slender delicate herb with very small white flowers, in S. India (larger in the Himalaya), in shady places.

2. *CAMPANULA RAMULOSA*, Wall., *C. colorata*, C. B. Clarke ; F. B. I. iii. 440, in part, not of Wall.

W. Ghâts, Nilgiri and Pulney Hills, about 7,000 ft.

An erect herb with leafy strigosely hairy stems, lanceolate leaves, calyx-lobes which are toothed and blue flowers, the pedicels short.

3. *CAMPANULA WIGHTII*, Gamble n. comb. *C. ramulosa*, Wt. Ic. t. 1178, not of Wall. *C. colorata*, C. B. Clarke in F. B. I. iii. 440, in part, not of Wall.

W. Ghâts, Nilgiri and Pulney Hills, above 6,000 ft.

A soft herb with many slender stems from a thick rootstock, ovate dentate leaves, short calyx-lobes and small purple flowers with short pedicels. It seems to be usually found without corolla or stamens, though fertile.

4. *CAMPANULA ALPHONSI*, Wall. ; F. B. I. iii. 440, Wt. Ic., t. 1177.

W. Ghâts, Nilgiri, Anamalai and Pulney Hills, above 6,000 ft., in clefts of rocks.

A small tufted wiry herb with many stems, the flowers blue.

5. *CAMPANULA FULGENS*, Wall. ; F. B. I. iii. 442 ; Wt. Ic. t. 1179.

W. Ghâts, Nilgiri, Anamalai and Pulney Hills above 5,000 ft. ; Shevaroy Hills of Salem ; Bababudan Hills of Mysore.

An erect herb with racemose terminal inflorescence and purple flowers.

Family LXXXIX. VACCINIACEAE.

Shrubs or small trees, often epiphytic. *Leaves* alternate or falsely whorled, entire or serrate ; stipules 0. *Flowers* hermaphrodite, regular, in racemes or solitary axillary ; pedicels 1-bracteate and often 2-bracteolate, frequently articulate below the ovary. *Calyx*-tube ovoid, adnate to the ovary ; limb 5-fid, usually persistent. *Corolla* tubular urceolate or campanulate, 5-lobed, usually deciduous. *Stamens* 10, epigynous, free ; anthers opening by apical pores or produced upwards in 2 tubes opening by slits. *Ovary* inferior, 5-celled or falsely 10-celled ; ovules many ; style cylindric ; stigma simple. *Fruit* a 5- or falsely 10-celled berry, rarely dry and indehiscent. *Seeds* many, rarely 1, in each cell, small, compressed ; albumen fleshy ; embryo minute.

Vaccinium, Linn.

Shrubs, sometimes epiphytic. *Leaves* alternate. *Flowers* axillary or terminal, in racemes fascicles or corymbs rarely solitary ; bracteate and 2-bracteolate. *Calyx*-tube globose ; teeth 5, small. *Corolla* tubular or ovoid, white, pink or greenish. *Stamens* 10, free ; anthers produced at the apex in 2 cylindric tubes with terminal openings. *Ovary* 5-, or apparently but falsely 10-, celled. *Berry* globose, 5-celled. *Seeds* 1 or more in each cell, compressed.

Large shrub ; leaves lanceolate acuminate, crenate-serrate ; corolla .25 in. long, pubescent without ; berries usually .2 in. diam.1. *neilgherrense*.
Small stout trees ; leaves ovate or ovate-lanceolate or orbicular, acute or obtuse, minutely serrate ; corolla .3 in. long, glabrous without ; berries .3 in. in diam. or more.2. *Leschenaultii*.

1. *VACCINIUM NEILGHERRENSE*, Wt. Ic. t. 1189 ; F. B. I. iii. 454.

Bababudan Hills of Mysore, Shevaroy Hills of Salem, Kollimalai Hills of Trichinopoly ; W. Ghâts, Nilgiris, Anamalais, Pulneys and hills of Tinnevely and Travancore, at about 3,000—7,000 ft. in Shola forest or, at lower levels, near streams.

A large shrub, occasionally a small tree with white or rose-coloured scented flowers in rather lax racemes. Bark thin, greyish-brown ; wood reddish-brown. Vern. *Tam.* Kalávu.

2. *VACCINIUM LESCHENAUTII*, Wt. Ic. t. 1188; F. B. I. iii. 455; Bedd. Fl. t. 227.

W. Gháts, Nilgiris, Anamalais, Pulneys and hills of Travancore and Tinnevely in Sholas above 5,000 ft.

A small pretty tree with ovate leaves and pink flowers in short close racemes. Bark thin, greyish-brown; wood light reddish-brown with pretty silver-grain. Berries edible. Vern. *Tam.* Kalávu; *Badaga*, Anduvan.

Var. *rotundifolia*, C. B. Clarke; Wt. Ill. t. 139. Leaves orbicular, 1—1.5 in. in diam. Nilgiri Hills (Wight, Gardner).

Family XC. ERICACEAE.

Trees, shrubs or perennial herbs. *Leaves* alternate or apparently whorled, entire or serrate; stipules 0. *Flowers* regular or sometimes slightly irregular, sometimes dimorphous. *Calyx* usually free, 5-, rarely 4- or 6-lobed. *Corolla* hypogynous, campanulate cylindric or urceolate, 4-5-lobed or sometimes petals free. *Stamens* 10, sometimes 5, 8 or 20, hypogynous or slightly attached to the base of the corolla; anthers opening by apical pores or produced upwards in tubes, sometimes dorsally spurred. *Ovary* 5-celled or rarely 4—16-celled; ovules many; style cylindric; stigma simple or shortly lobed. *Fruit* a capsule, 5- or more-celled, sometimes appearing baccate from the adherence of the enlarged succulent calyx. *Seeds* many, small, angled or compressed, albuminous.

Shrub; capsule 5-valved loculicidally, surrounded when ripe by the succulent enlarged calyx; flowers small; anthers spurred at apex.....1. *Gaultheria*.
Tree; capsule 10-valved septicidally, calyx small, not succulent in fruit; flowers large; anthers slightly spurred at base, not at apex.....2. *Rhododendron*.

1. *Gaultheria*, Linn.

Shrubs, erect or procumbent. *Leaves* persistent, alternate, serrulate. *Flowers* small, sometimes dimorphous, in axillary or terminal racemes or solitary; bracteate and 2-bracteolate. *Calyx* 5-lobed, free, afterwards succulent and enclosing the capsule. *Corolla* ovoid-tubular or campanulate, greenish-white or reddish; lobes 5, small. *Stamens* 10; filaments more or less dilated; anther-cells opening by slits at the apex and dorsally 2-spurred; in dimorphic flowers the stamens are small with simple anthers. *Ovary* 5-celled; ovules many in each cell; style cylindric; stigma simple. *Fruit* a 5-celled capsule enclosed in the succulent calyx, loculicidally 5-valved from the apex. *Seeds* many, minute, angled.

GAULTHERIA FRAGRANTISSIMA, Wall.; F. B. I. iii. 457; Bot. Mag. t. 5984. *G. Leschenaultii*, DC.; Wt. Ic. t. 1195.

W. Gháts, Nilgiris, Pulneys and hills of Travancore, above 6,000 ft.

A large shrub with white or greenish flowers in axillary racemes, coriaceous elliptic serrulate leaves and blue succulent berries. Bark light brown, thin; wood light brown. The leaves give an oil like that of the Canadian wintergreen. The fruits are edible.

2. *Rhododendron*, Linn.

Trees or shrubs. *Leaves* coriaceous, entire, alternate, often clustered towards the ends of the branches. *Flowers* usually large, in terminal fascicles or pseudo-corymbs, rarely solitary or axillary; bracts broad, usually caducous; bracteoles linear. *Calyx* 5-lobed, persistent, usually very small. *Corolla* campanulate, funnel-shaped or tubular, 5—10-lobed. *Stamens* 5—18, usually 10; filaments slender; anthers oblong, dehiscing by terminal pores. *Ovary* 5—20-celled; ovules numerous in each cell; style slender; stigma capitate. *Fruit* a woody 5—20-celled capsule, dehiscing septicidally, the valves separating from the placentas from above downwards. *Seeds* very many, ellipsoid, albuminous, the testa often tailed or crested.

RHODODENDRON NILAGIRICUM, Zenk. Pl. Ind. Coimb. t. 15. *R. arbo-
reum*, var. *nilagirica*, C. B. Clarke; F. B. I. iii. 466.

W. Ghâts, Nilgiris, Pulneys and hills of Travancore, above 5,000 ft., in open grass lands.

A tree with beautiful terminal heads of usually crimson bracteate flowers surrounded by the very coriaceous elliptic or elliptic-oblong leaves, very furfuraceous beneath, usually obtuse at both ends and with recurved margins. The hard capsule is about .75 in. long. Bark reddish-brown wood reddish-white, soft, close and even-grained, little used except as fuel. Vern. *Tam.* Alingi; *Mal.* Kattu puvarasu.

Family XCI. PLUMBAGINACEAE.

Herbs or undershrubs. *Leaves* alternate, the radical usually rosulate; stipules 0. *Flowers* hermaphrodite, regular, in terminal scapes or branches, in heads spikes racemes or panicles; bracts often scarious; bracteoles 2. *Calyx* inferior, gamosepalous, tubular, 5—10-ribbed, often hyaline between the ribs, lobes 5. *Corolla* hypogynous, of 5 petals free or connate at the base or united in a linear tube. *Stamens* 5, opposite the petals; filaments nearly free or adnate below to the corolla; anthers oblong. *Ovary* superior, 1-celled, 5-angular above; ovule 1, pendulous from a basal ascending funicle; styles 5, free or connate below; stigmas subcapitate. *Fruit* a capsule, membranous below and circumsciss, hardened above and there 5-valved. *Seed* cylindric, pendulous; albumen floury or 0; embryo straight; cotyledons linear or oblong, radicle superior.

Plumbago, Linn.

Perennial herbs or undershrubs, often scandent. *Leaves* alternate, entire, petiole often auricled at base. *Flowers* white rose-coloured or blue in terminal spikes. *Calyx* tubular, covered with stalked glands, lobes 5. *Corolla*-tube long, slender; lobes 5, spreading. *Stamens* free; anthers oblong, dorsifixed. *Ovary* narrowed at apex; styles divided into stigmatose branches. *Capsule* circumsciss at the base, hardened above. *Seed* solitary; albumen scanty, cotyledons oblong.

PLUMBAGO ZEYLANICA, Linn.; F. B. I. iii. 480; Wt. III. t. 179.

All Districts in the Plains, common, wild or in cultivation.

A rambling subscandent perennial herb with white flowers and a conspicuously glandular persistent calyx, the leaves ovate, membranous. The root is used in medicine. Vern. *Hind*. Chita.

P. rosea, Linn., is a pretty species with bright red flowers and larger leaves, frequently found in cultivation or as an escape. *P. capensis*, Thunb., is a climber with pale blue flowers also found in gardens.

Family XCII. PRIMULACEAE.

Perennial, rarely annual herbs. *Leaves* radical or cauline; stipules 0. *Flowers* hermaphrodite, regular, solitary or racemose in the leaf axils or solitary or in umbels on an elongated scape; bracts variable, sometimes 0. *Calyx* inferior, 5-, rarely 4—9-cleft, rarely superior. *Corolla* usually hypogynous, rotate campanulate or funnel-shaped, 5-, rarely 4—9-lobed. *Stamens* inserted on the corolla-tube and opposite its lobes, sometimes with alternating staminodes; filaments usually short; anthers 2-celled, dehiscing longitudinally. *Ovary* 1-celled, usually free, ovoid or subglobose; ovules many, on a free central placenta; style short or long; stigma entire. *Fruit* a capsule dehiscing transversely or by valves. *Seeds* few or many, minute, usually angular, often sunk in the placenta; albumen fleshy or horny; embryo transverse.

Corolla-lobes imbricate, tube short; capsule dehiscing by valves; herbs, usually scapigerous.....1. *Androsace*.

Corolla-lobes contorted, separate nearly to the base; leaves opposite or alternate:—
Capsule dehiscing by valves.....2. *Lysimachia*.

Capsule circumscissile.....3. *Anagallis*.

1. *Androsace*, Linn.

Annual or perennial low herbs. *Leaves* rosulate or imbricate on the branches. *Flowers* small, white lilac or red. *Calyx* 5-lobed. *Corolla* salver-shaped with a short tube or funnel-shaped; limb imbricately 5-lobed, the mouth annulate or with folds opposite the lobes. *Stamens* 5; anthers subsessile, included in the tube, obtuse. *Ovary* globose; style short. *Capsule* ovoid or globose, 5-valved. *Seeds* angular or subglobose; embryo transverse.

ANDROSACE SAXIFRAGAEFOLIA, Bunge; F. B. I. iii. 496.

N. Circars, in Ganjam (*Barber*) in open pasture lands.

An annual herb with rosulate suborbicular cordate crenate leaves, white flowers with filiform pedicels in bracteate umbels on slender scapes, and white capsules with several angular pitted seeds.

2. *Lysimachia*, Linn.

Erect procumbent or creeping herbs. *Leaves* entire, alternate, opposite or whorled. *Flowers* solitary, white pink or yellow, on axillary pedicels or in terminal or axillary racemes or panicles; bracts usually

conspicuous, sometimes 0. *Calyx* 5—6-partite. *Corolla* rotate or funnel-shaped, deeply 5—6-lobed. *Stamens* inserted on the base of the corolla lobes, sometimes connate at the base in a short tube; anthers oblong, obtuse. *Ovary* subglobose, ovules many; style filiform, persistent; stigma obtuse. *Fruit* a globose or subglobose capsule, 5-valved or bursting irregularly. *Seeds* many, trigonous or plano-convex; embryo transverse.

Flowers pink in elongate terminal racemes, pedicels slender, bracts subulate; leaves alternate, lanceolate, acute, smooth or crisped at the margins, glabrous, gland-dotted; corolla-lobes obovate, spatulate; stamens with slender exsert filaments.

1. *Leschenaultii*.

Flowers white in slender terminal racemes, pedicels slender, bracts subulate; leaves alternate oblanceolate or spatulate, acute, glabrous, gland-dotted; corolla-lobes obovate; filaments slender, not exsert.....2. *obovata*.

Flowers yellow, solitary or in pairs in the leaf-axils; pedicels slender, pubescent; bracts 0; leaves opposite, ovate, acute or obtuse, crispate-pubescent; corolla-lobes broadly obovate, gland-dotted; stamens included, the filaments united at the base

3. *deltoidea*.

1. *LYSIMACHIA LESCHENAUTII*, Duby; F. B. I. iii. 501; Wt. Ic. t. 1204.
W. Ghâts, Nilgiris, Anamalais and Pulneys, in moist or marshy soils above 6,000 ft.

A tall herb with pretty, many-flowered racemes.

2. *LYSIMACHIA OBOVATA*, Buch.-Ham.; F. B. I. iii. 502.
W. Ghâts, Nilgiris, on the downs about 7,000 ft. (Williams).
A slender herb.

3. *LYSIMACHIA DELTOIDEA*, Wt. Ill. t. 144; F. B. I. iii. 505.
W. Ghâts, Nilgiris, Anamalais and Pulneys, on shady banks, above 6,000 ft.
A slender trailing herb not unlike the "Creeping Jenny" of Europe (*L. nummularia*) but with much crisp pubescence.

3. *Anagallis*, Tournef.

Annual or perennial herbs. *Leaves* opposite, entire. *Flowers* solitary, axillary, peduncled, red blue or white; bracts 0. *Calyx* 5-partite. *Corolla* rotate, 5-partite, the lobes contorted. *Stamens* 5, adnate to the corolla. *Ovary* globose; ovules many; style filiform. *Fruit* a globose circumsciss capsule. *Seeds* many, peltate.

Corolla longer than the calyx; leaves opposite; erect or procumbent much-branched herbs with 4-angled stems.....1. *arvensis*.
Corolla shorter than the calyx; leaves alternate or the lower subopposite; small erect herbs with angular stems somewhat winged.....2. *pumila*.

1. *ANAGALLIS ARVENSIS*, Linn.; F. B. I. iii. 506. *A. latifolia*, Linn.; Wt. Ic. t. 1205.

All Districts, a weed of cultivated fields. Pimpernel.

So far as is recorded, only the blue-flowered form (var. *caerulea*, Gren. and Godr.) occurs in S. India.

2. *ANAGALLIS PUMILA*, Swartz. *Centunculus tenellus*, Duby; F. B. I. iii. 506; Wt. Ic. t. 2000. *Micropyxis tenella*, Wt. Ic. t. 1585.

N. Circars, Bison Hills of Godavari (Barber); Deccan, at Hosur in Salem; W. Ghâts, Nilgiris and Anamalais at about 3,000 ft., among grass.

A small slender erect annual weed with white flowers.

Family XCIII. MYRSINACEAE.

Trees, shrubs (erect or climbing) or undershrubs, generally evergreen. *Leaves* alternate or sometimes opposite, simple, usually gland-dotted; stipules 0. *Flowers* regular, hermaphrodite or polygamo-dioecious, often with resinous glands. *Calyx* inferior (in *Maesa* adnate to the ovary), 4—6-lobed, persistent, sometimes enlarged in fruit, often with glandular dots or lines. *Corolla*-tube usually short or none; lobes 4—6, contorted or imbricate, rarely valvate, often gland-dotted or -striate. *Stamens* as many as and opposite to the corolla-lobes; filaments usually short; anthers opening by slits, sometimes septate; staminodes sometimes present. *Ovary* globose or ovoid, 1-celled; ovules few or many, on a free central usually globose placenta; style filiform or columnar; stigma simple, rarely shortly lobed. *Fruit* a small globose (in *Aegiceras* linear, curved, acuminate), indehiscent, 1—many-seeded berry. *Seeds* usually globose, hollowed at the base (in *Maesa* many and angled), albumen pitted or ruminant; embryo transverse.

Calyx-tube adnate to the ovary; fruit many-seeded; trees or shrubs.....1. *Maesa*.
Calyx-tube free from the ovary; fruit 1-seeded:—

Fruit globose, anther-cells usually opening by slits:—

Corolla-lobes imbricate in bud, free or tube very short; anthers cordate:—

Flowers in axillary or lateral fascicles; trees or shrubs.....2. *Rapanea*.

Flowers in racemes or panicles; shrubs or climbers.....3. *Embelia*.

Corolla-lobes contorted in bud:—

Anthers sagittate, rarely septate; corolla-lobes overlapping to the right

4. *Ardisia*.

Anthers lanceolate, the connective produced in a wing; corolla-lobes overlapping to the left.....5. *Antistrophe*.

Fruit elongate, cylindric, curved, long pointed; anthers septate.....6. *Aegiceras*.

1. *Maesa*, Forsk.

Trees or shrubs, erect or straggling. *Leaves* entire, dentate or serrate, usually pellucid-punctate, sometimes with resinous lines. *Flowers* small, hermaphrodite or unisexual, in terminal or axillary often paniced racemes; bracts small; bracteoles 2. *Calyx*-tube adnate to the ovary; lobes 4—5, small, persistent. *Corolla* shortly campanulate, 4—5-lobed, the lobes imbricate, rounded with inflexed tips, sometimes resinous-linear. *Stamens* 4 or 5 inserted on the corolla-tube; filaments short; anthers introrse, oblong-cordate. *Ovary* adnate to the calyx-tube; ovules numerous, on a globose placenta; style short; stigma entire or lobed. *Fruit* a small dry or fleshy globose berry, crowned with the persistent style. *Seeds* numerous, angular, arranged around the placenta with hexagonal surfaces; embryo small, transverse; cotyledons narrowly ovate.

Calyx-lobes ciliate on the margins:—

Branches and leaves beneath densely ferruginous-tomentose when young, later on pilose; leaves elliptic, acuminate, serrate, usually obtuse at base, the petioles .5 in. long.....1. *velutina*.

Branches and leaves sparsely pilose; leaves elliptic, acuminate, coarsely serrate, slightly attenuate at base, the petioles .75 in. long.....2. *dubia*.

Calyx-lobes not ciliate on the margins; whole plant glabrous; leaves ovate-lanceolate, acuminate, coarsely dentate or serrate, acute at base, the petioles about 1 in. long.....3. *Perrottetiana*.

1. MAESA VELUTINA, Mez in Engl. Monog. Myrs. 35.
W. Gháts, in Wynaad (Beddome).
Apparently a large shrub, very ferruginous-tomentose when young, less so when old, the leaf serratures strong and regular.
2. MAESA DUBIA, Wall. ; F. B. I. iii. 510.
Hills of Mysore, Brumagiris, etc., at 3,000—5,000 ft. ; Wynaad ; S. Canara.
A large shrub, more or less pilose, perhaps only a variety of the next.
3. MAESA PERROTTETIANA, A. DC. *M. indica* var. *Perrottetiana*, C. B. Clarke ; F. B. I. iii. 509. *M. indica*, Wt. Ic. t. 1206 not of A. DC.
W. Gháts, in all Districts, up to 6,000 ft., chiefly on waste lands and in open forests, common ; Shevaroy Hills of Salem and Kollimalai Hills of Trichinopoly.
A small tree or large shrub with ovate lanceolate acuminate or even caudate-acuminate, coarsely dentate or serrate, glabrous leaves with long petioles, the white flowers very small, the berries white. Bark thin, reddish-brown, lenticellate ; wood brownish-white, soft. Vern. *Mal.* Kirithi.

2. Rapanea, Aubl.

Trees or shrubs. *Leaves* coriaceous, usually entire and marked with resinous dots or lines. *Flowers* polygamous or dioecious, small, sessile or shortly pedicelled, in umbellate rarely racemose fascicles on short thick peduncles, in the axils of the leaves or on the branches below the leaves ; bracts imbricate. *Calyx* small, persistent, 4—5-lobed, often glandular-dotted. *Corolla*-tube, very short or almost 0, lobes 4—5, spreading, valvate, gland-dotted. *Stamens* inserted on the corolla ; filaments 0 ; anthers ovate. *Ovary* free, globose or ovoid, 1-celled ; ovules few or many, immersed in the placenta ; style short ; stigmas 2—5, erect or spreading, sometimes cup-shaped. *Fruit* a small globose, dry or subfleshy berry, the endocarp often glandular-striate. *Seed* solitary, albumen usually pitted ; embryo elongate, often curved.

Flowers sessile or nearly so ; branchlets stout, rough ; leaves very shortly petioled, elliptic or obovate, up to 4·5 in. long by 1·5—2 in. wide, obtusely acute ; calyx and corolla both densely covered with resinous dots and lines

1. *capitellata* var. *sessilis*.

Flowers very shortly pedicelled ; branchlets not very stout ; leaves with slender petioles :—

Calyx-lobes with few resinous lines or dots :—

Corolla-lobes with few dots at apex only ; leaves oblanceolate, obtuse or emarginate, up to 3 in. long, 1 in. broad, chartaceous, striate.....2. *striata*.

Corolla-lobes densely papillose, sparsely dotted ; leaves linear-lanceolate, obtuse, up to 2·5 in. long, ·5 in. broad, coriaceous.....3. *daphnoides*.

Calyx-lobes with many resinous lines and dots ; corolla-lobes gland-dotted or -lined all over ; leaves oblanceolate, obtuse, up to 3 in. long, 1 in. broad

4. *Wightiana*.

Flowers with pedicels about ·2 in. long ; branchlets thick ; leaves obovate or oblanceolate, up to 4 in. long, 1·25 in. broad, rounded or emarginate at apex ; corolla-lobes sparsely dotted.....5. *Thwaitesii*.

1. *RAPANEA CAPITELLATA*, Mez. *Myrsine capitellata*, Wall.; F. B. I. iii. 512, *in part*.
 Var. *sessilis*, Gamble. Leaves sessile or nearly so, not long petioled as in the northern forms.
 W. Gháts, Anamalai Hills, on grass-lands at high elevations (Barber); Travancore Hills, above 6,000 ft. (Bourdillon).
 A small tree.
2. *RAPANEA STRIATA*, Mez Monog. Myrs. 357.
 Bababudan Hills of Mysore (Law).
 Apparently a small tree.
3. *RAPANEA DAPHNOIDES*, Mez Monog. Myrs. 357.
 W. Gháts, hills of Tinnevely and Travancore, at about 6,000 ft.
 A low shrub probably, with narrow linear-lanceolate leaves.
4. *RAPANEA WIGHTIANA*, Mez. *Myrsine capitellata* var. *lanceolata*, C. B. Clarke in F. B. I. iii. 512. *M. capitellata*, Wt. Ic. t. 1211; Bedd. Fl. t. 234.
 W. Gháts, Nilgiris, Pulneys and hills of Tinnevely and Travancore, above 6,000 ft., in evergreen Shola forests.
 A small tree. Bark thick, grey; wood grey, moderately hard.
 Vern. *Badaga* Kokili.
5. *RAPANEA THWAITESII*, Mez Monog. Myrs. 357.
 W. Gháts, Pulney Hills of Madura, 6,500 ft. (Wight).
 A small tree, the flowers pedicellate.

3. *Embelia*, Burm.

Small trees or shrubs, usually climbing. *Leaves* alternate, entire or toothed, usually glandular, petiole often margined or glandular. *Flowers* small, hermaphrodite or polygamo-dioecious, white or pink, in axillary or terminal simple or compound racemes or panicles; bracts usually small; bracteoles 0. *Calyx* free, persistent, 4—5-lobed. *Corolla*-tube none or short; petals 4—5, usually imbricate in bud. *Stamens* 4—5; filaments inserted on the corolla, short or elongate; anthers ovate-oblong. *Ovary* ovoid or globose; ovules few, on a subglobose placenta; style short; stigma capitate. *Fruit* a small globose usually 1-seeded berry. *Seed* globose, hollowed at the base; testa membranous; albumen pitted; embryo transverse, curved.

Petals 5. Inflorescence terminal and axillary, in racemes or panicles of racemes; climbers:—

Petals very small, villous on both sides; leaves chartaceous, elliptic or elliptic-lanceolate, obtusely acute, 2—3 in. long, 1 in. broad, gland-dotted and with glandular pits near the midrib beneath, petiole slender.....1. *Ribes*.
 Petals rather larger, glabrous without, papillose within; leaves coriaceous, elliptic-ovate or -oblong, acute, up to 6 in. long, 2.5 in. broad, not gland-dotted or -pitted, petiole stout.....2. *adnata*.

Inflorescence axillary:—

Inflorescence of subumbellate racemes on very short peduncles, petals oblong, gland-dotted; leaves ovate, coriaceous, crenate, prominently reticulate, rusty-pilose on the nerves beneath or on the branchlets, up to 3 in. long, 1.5 in. broad; climber.....3. *Gardneriana*.

Inflorescence racemose, axillary to the normal leaves without imbricate scales at its base; erect with membranous leaves:—

Leaves glabrous, pale and reticulate beneath, elliptic-obovate, cuneate, abruptly acuminate, sometimes slightly dentate, up to 3.5 in. long, 2 in.

broad; racemes nearly glabrous, about 2—3 in. long, petals obtuse, papillose within; anthers exsert, orbicular, mucronate, glandular on the back

4. *Tsjeriam-Cottam*.

Leaves beneath stellate-pubescent, elliptic-obovate, cuncate, abruptly acuminate, up to 4 in. long, 2.5 in. broad; racemes very villous, 1—3 in. long, calyx-lobes, petals and ovary with many minute stalked glandular hairs; anthers exsert, ovoid, mucronate, glandular

5. *villosa*.

Petals 4; inflorescence axillary to the scars of fallen leaves with imbricate scales at its base; climbing shrub with coriaceous elliptic-obovate leaves narrowed at base, up to 4 in. long, 1.5 in. broad, racemes less than 1 in. long, the petals with orange-coloured papillae inside

6. *Basaal*.

1. *EMBELIA RIBES*, Burm.; F. B. I. iii. 513. *E. glandulifera*, Wt. Ic. t. 1207.

N. Circars, hills of Vizagapatam, 4,000 ft.; W. Gháts, in all Districts, in evergreen forests at elevations up to about 4,000 ft. A large climbing shrub with small white or greenish-white flowers and a globose peppercorn-like fruit. Bark brown, rough with conical hard protuberances. Vern. *Hind.* Baberang.

2. *EMBELIA ADNATA*, Bedd.; F. B. I. iii. 514.

W. Gháts, Bolampatti Hills of Coimbatore at 5,000 ft. (Beddome); High Wavy Mountain in Madura at 4,000—5,000 ft. (Blatter and Hallberg).

A large climbing shrub with large thick leaves, the margins recurved.

3. *EMBELIA GARDNERIANA*, Wt. Ic. t. 1208; F. B. I. iii. 517.

W. Gháts, Sispara Ghát in Nilgiris, at 5,000 ft.

A climbing shrub with white flowers and fruit .25 in. in diam., the branches clothed with rufous hairs.

4. *EMBELIA TSJERIAM-COTTAM*, A. DC.; Wt. Ic. t. 1209. *E. robusta*, C. B. Clarke; F. B. I. iii. 515, *not of* Roxb.

Most Forest Districts in the Circars and Deccan; deciduous forest areas in the W. Gháts, up to about 3,000 ft.

A large shrub or small tree with greenish-white flowers, long racemes (in true *E. robusta*, Roxb., they are very short and capitulate) and red berries. Bark brown, horizontally cracked; wood reddish, resinous, with broad medullary rays. Vern. *Hind.* Baberang; *Ur.* Nuninunika, Baibedanga; *Mar.* Ambati.

5. *EMBELIA VILLOSA*, Wall. *E. robusta*, C. B. Clarke; F. B. I. iii. 515, *in part*.

N. Circars, forests of Ganjam and Vizagapatam, up to 4,500 ft.; Deccan, hills of Mysore.

A shrub or small tree, similar to the last but with villous leaves and racemes and more glandular flowers, sometimes tetramerous.

6. *EMBELIA BASAAL*, A. DC.; Mez Monog. Myrs. 328. *E. viridiflora*, C. B. Clarke; F. B. I. iii. 516. *Choripetalum aurantiacum*, A. DC.; Wt. Ic. t. 1210. *Samara Rheedii*, Wt. Ic. t. 1591.

Deccan, Bababudan Hills of Mysore; Carnatic, Melpat in S. Arcot, Kollimalai Hills of Trichinopoly, Shevaroy; W. Gháts, in most Districts at 2,000—5,000 ft.

A large climbing shrub with racemes of orange-coloured flowers from the older branchlets.

4. *Ardisia*, Swartz.

Shrubs or small trees. *Leaves* sessile or petioled, membranous to coriaceous, entire crenate or serrate, usually gland-dotted. *Flowers* regular, hermaphrodite, in axillary lateral or terminal simple or compound umbels or racemes; pedicels often lengthening in fruit; bracts small, usually deciduous. *Calyx* 5-, rarely 4-, lobed, the lobes free or overlapping to the right, persistent. *Corolla* red, white or spotted, often waxy in appearance, 5-, rarely 4- or 6-, lobed, the lobes overlapping and twisted to the right in bud. *Stamens* as many as and opposite to the corolla-lobes; filaments short; anthers sagittate, dehiscing longitudinally and introrsely, in one species septate. *Ovary* globose; ovules few or many, immersed in a globose placenta; style cylindric; stigma terminal, small. *Fruit* a globose or subglobose berry. *Seed* globose, hollowed at base; albumen pitted or ruminant; embryo cylindric, transverse.

Calyx-lobes small, usually not or only little overlapping to the right; inflorescence axillary or lateral, peduncles and pedicels slender; anthers apiculate:—

Leaves entire or very obscurely crenulate, glabrous, nerves not prominent:—

Calyx- and corolla-lobes punctate, the flowers also with capitate scales on the margins; inflorescence of few-flowered cymes or umbels, the peduncles short:—

Leaves rhomboid, acuminate both at apex and base, up to 4 in. long, 1.5 in. broad but usually smaller, margin usually recurved...1. *rhomboidea*.

Leaves long-lanceolate, acuminate, up to 7 in. long, 2 in. broad, but often smaller, margin not recurved.....2. *pauciflora*.

Calyx- and corolla-lobes not or very faintly punctate; leaves narrow-lanceolate, acuminate, up to 4 in. long, 1 in. broad; peduncles long and slender

3. *depressa*.

Leaves crenate-serrate, prominently nerved, the nerves impressed on the upper surface, elliptic-lanceolate or oblanceolate, caudate-acuminate at apex, cuneate at base, up to 4 in. long, 1.5 in. broad; calyx- and corolla-lobes densely black-punctate; cymes with many very small flowers.....4. *Blatteri*.

Calyx-lobes moderate-sized, acute, overlapping to the right; inflorescence paniculate, terminal or subterminal; anthers acute:—

Panicles short, compact; leaves prominently dotted with glands near the margin, faintly crenulate:—

Leaves oblong lanceolate, acuminate, membranous, rounded at base, up to 6 in. long, 1.5 in. broad; peduncles short, slender, as are the pedicels, umbels few-flowered.....5. *amplexicaulis*.

Leaves obovate or oblanceolate, acuminate, decurrent on the petiole, chartaceous, up to 9 in. long, 2 in. broad; peduncles stout as are the pedicels, umbels many-flowered, usually drooping.....6. *sonchifolia*.

Panicles large, spreading, up to 10 in. long, longer in fruit when the pedicels elongate, many-branched; leaves coriaceous, oblanceolate, acute at apex, rounded and more or less auricled at base, up to 12 in. long, 2.5 in. broad, whorled at the base of the panicle, not dotted with glands near the margin.....7. *missionis*.

Calyx-lobes large and broad, clearly overlapping to the right, rounded at tip, ciliate; inflorescence lateral or axillary, rarely subterminal; leaves entire, minutely dotted, glabrous:—

Anthers septate; leaves succulent-coriaceous, obovate, obtusely acute, up to 5 in. long, 2 in. broad; umbellate racemes on peduncles about 1 in. long; corolla-lobes obliquely ovate-acuminate, gland-dotted.....8. *littoralis*.

Anthers not septate; leaves subcoriaceous, obovate or oblanceolate, obtusely acuminate, up to 10 in. long, 3 in. broad; umbellate racemes on peduncles about 2 in. long; corolla-lobes ovate, rounded or slightly acute, gland-dotted

9. *solanacea*.

1. *ARDISIA RHOMBOIDEA*, Wt. Ic. t. 1213; F. B. I. iii. 529.
W. Gháts, Anamalai Hills and hills of Travancore and Tinnevely, at 2,000—6,000 ft., in evergreen forests.
A glabrous shrub or small tree with pinkish-white flowers.
2. *ARDISIA PAUCIFLORA*, Heyne; F. B. I. iii. 529; Wt. Ic. t. 1214.
W. Gháts, evergreen forests from the Wynaad southwards, up to 5,000 ft., common; Brumagiri Hills of Mysore.
A small tree with white flowers and red berries.
3. *ARDISIA DEPRESSA*, C. B. Clarke; F. B. I. iii. 522.
E. Gháts, Hills of Vizagapatam, at 4,000—5,000 ft. (A. W. Lushington).
A large shrub with pinkish flowers.
4. *ARDISIA BLATTERI*, Gamble in Kew Bull. 1921, 121.
W. Gháts, "High Wavy Mountain," Madura, at 4,000—5,500 ft. (Blatter and Hallberg), hills of Travancore, at 2,000—4,000 ft. (Bourdillon).
A small tree with prominently nerved leaves, pink flowers and black berries.
5. *ARDISIA AMPLEXICAULIS*, Bedd. Ic. t. 170; F. B. I. iii. 521.
W. Gháts, Tirrihoot Hills, Wynaad, at 3,000—4,000 ft. (Beddome); Hills of Travancore (Barber).
A glabrous shrub.
6. *ARDISIA SONCHIFOLIA*, Mez Monog. Myrs. 116. *A. villosa*, var. *obtus*a, C. B. Clarke; F. B. I. iii. 525.
W. Gháts, Anamalai Hills, at 4,000 ft. (Beddome, Barber), Sivagiri Hills of Tinnevely (Wight).
Apparently a small tree, with remarkable many-flowered umbels in dichotomous drooping panicles.
7. *ARDISIA MISSIONIS*, Wall.; F. B. I. iii. 519. *A. courtallensis*, Wt. Ic. t. 1215; F. B. I. iii. 520.
W. Gháts, S. Canara to Travancore, in evergreen forests.
A small tree with pale pink flowers and red berries, in large panicles.
8. *ARDISIA LITTORALIS*, Andr. Repos. x. t. 630. *A. polycephala*, Wt. Ill. t. 145 *not of* Wall. *A. humilis*, C. B. Clarke; F. B. I. iii. 529, *not of* Vahl *and in part only*.
W. Coast, along backwaters in Travancore.
A somewhat succulent shrub reaching about 3 ft. in height, with rose-coloured flowers, the berries red at first turning purplish black.
9. *ARDISIA SOLANACEA*, Roxb. Cor. Pl. t. 27. *A. humilis*, A. DC.; C. B. Clarke in F. B. I. iii. 529, *in part only*; Wt. Ic. t. 1212, *not of* Vahl.
All Forest Districts in the Circars, Deccan and Carnatic, usually in moist places and along streams, up to 5,000 ft. in the hills; also in evergreen forests of the W. Gháts, but less common.
A large shrub or small tree with pink flowers and black berries. Bark brown, smooth; wood grey, moderately hard, with broad medullary rays. Vern. *Hind.* Bisi; *Ur.* Kadna, Katapenga; *Tel.* Konda mayúr.

5. *Antistrophe*, A. DC.

Slender shrubs, the branchlets pubescent. *Leaves* alternate, lanceolate, acuminate, entire or dentate. *Flowers* hermaphrodite, in subsessile axillary umbels or solitary; pedicels slender; bracts small. *Calyx* 5-lobed, persistent. *Corolla* deeply 5-cleft; lobes lanceolate acuminate, overlapping to the left in bud. *Stamens* 5, on the throat of the corolla; filaments short; anthers free, lanceolate, opening longitudinally, the connective produced upwards in a membranous wing. *Ovary* ovoid; ovules several, on a globose central placenta; style filiform; stigma punctiform. *Fruit* a globose berry; pericarp coriaceous; endocarp chartaceous. *Seed* 1; albumen ruminant; embryo cylindric, transverse.

ANTISTROPHE SERRATIFOLIA, Hook. f.; F. B. I. iii. 532. *Ardisia serratifolia*, Bedd. Ic. t. 113.

Anamalai Hills, at 3,000 ft. (Beddome).

An erect shrub with rusty-villous branchlets, lanceolate, long acuminate leaves with prominent saw-tooth-like serratures and many (about 25) pairs of prominent parallel nerves, up to 8 in. long, 2 in. broad, and few-flowered axillary umbels of flowers.

6. *Aegiceras*, Gaertn.

Sea-coast shrubs or small trees; branches glabrous. *Leaves* coriaceous, entire, glabrous, alternate, petioled. *Flowers* hermaphrodite, white, in terminal or axillary umbels or panicles, pedicels slender; bracts 0. *Calyx* of 5 imbricate lobes, the lobes twisted to the left, overlapping to the right. *Corolla*-tube short, villous; lobes 5, overlapping to the right in bud, afterwards recurved. *Stamens* 5, on the corolla-tube; filaments linear, connate below and villous; anthers cordate-lanceolate, transversely septate. *Ovary* fusiform, narrowed into an elongate style; stigma small; ovules many, immersed in a central globose placenta. *Fruit* cylindric, curved, coriaceous, at length splitting longitudinally. *Seed* elongate, exalbuminous; radicle inferior, enlarged at base; cotyledons short; germination often taking place while still on the plant.

AEGICERAS CORNICULATUM, Blanco. *Ae. majus*, Gaertn.; F. B. I. iii. 533; Wt. Ill. t. 146.

Sea-coasts, both E. and W., in mangrove forests especially, and along tidal creeks.

A common and pretty small tree or large shrub with obovate emarginate coriaceous shining leaves, white flowers and an elongate curved fruit about 1 in. long. Bark grey; wood reddish-brown, often streaked with yellow, even-grained, mostly used for fuel. Vern. *Hind.* Halsi; *Tel.* Dudumara, Guggilam; *Tam.* Narikandam.

Family XCIV. SAPOTACEAE.

Trees or shrubs, generally evergreen, young parts often rusty-tomentose. *Leaves* alternate, rarely subopposite, entire, petioled stipules 0 or very caducous. *Flowers* hermaphrodite, axillary; pedicels clustered, rarely solitary or paniced; bracts 0; bracteoles 0 or minute.

Calyx-lobes 4–8, imbricate or biseriate with the outer ones valvate. *Corolla*-tube short; lobes as many or 2–4 times as many as those of the calyx. *Stamens* inserted on the corolla-tube, as many as the lobes and opposite to them or 2–3 times as many, 1–3-seriate; filaments usually short; anthers lanceolate, the connective often produced; staminodes when present alternate with the stamens. *Ovary* superior, sessile, 2–8-celled; ovules solitary in each cell, attached to the inner angle; style subulate. *Fruit* an indehiscent 1–8-seeded berry. *Seeds* if single ellipsoid, if more compressed; hilum conspicuous; testa usually crustaceous, shining; exalbuminous with large fleshy cotyledons or albuminous with flat cotyledons; radicle inferior.

- Calyx*-lobes 1-seriate, imbricate; stamens 5–6:—
 Staminodes 0; leaf main-nerves close and parallel.....1. **Chrysophyllum**.
 Staminodes present; leaf main-nerves distant, few.....2. **Sideroxylon**.
Calyx-lobes 2-seriate, outer series valvate:—
Calyx-lobes 4:—
 Seeds albuminous; stamens 8.....3. **Isanandra**.
 Seeds exalbuminous; stamens 12 or more.....4. **Bassia**.
Calyx-lobes 6–8:—
 Staminodes 0; seeds exalbuminous.....5. **Palaquium**.
 Staminodes present; seeds albuminous.....6. **Mimusops**.

1. **Chrysophyllum**, Linn.

Trees with milky juice. *Leaves* subcoriaceous, main nerves usually very many, slender, parallel; stipules 0. *Flowers* small, in axillary fascicles, hermaphrodite. *Calyx* 5–6-lobed, the lobes subequal, imbricate. *Corolla* tubular-campanulate, 5–6-lobed, the lobes entire, imbricate. *Stamens* equal in number to, and opposite to, the corolla-lobes; filaments subulate; anthers ovate; staminodes 0. *Ovary* villous, 5–6, rarely more -celled; ovules 1 in each cell, attached to the central placenta; style glabrous. *Fruit* a fleshy or coriaceous globose berry. *Seeds* large, flattened; testa very hard, with a conspicuous elongate hilum; albumen fleshy; cotyledons flat.

CHRYSOPHYLLUM ROXBURGHII, G. Don; F. B. I. iii. 533; Bedd. Fl. t. 236.

N. Circars, Rumpa Hills of Godavari; Hills of W. Mysore; W. Ghâts, Anamalais and hills of Travancore, up to 4,000 ft., in evergreen forests. The Star Apple.

A lofty evergreen tree with shining closely nerved leaves, small greenish white flowers and large yellowish-green berry with hard flat polished brown seeds. Bark dark grey, smooth; wood greyish-white, cross-grained, not durable. Vern. *Tam.* Kappalei; *Mal.* Atha; *Mar.* Tarsi.

C. Caimito, Linn., the West Indian Star Apple, is occasionally found in gardens and has an edible fruit and pretty leaves covered beneath with golden silky pubescence.

Achras Sapota, Linn. The Sapota or Sapodilla plum is a large tree, sometimes cultivated for its edible fruit.

2. **Sideroxylon**, Linn.

Trees, rarely shrubs, sometimes thorny, the spines being arrested branchlets. *Leaves* alternate; stipules 0. *Flowers* small, in fascicles in

the axils of the leaves or of the scars of fallen leaves, subsessile or shortly pedicelled. *Calyx* of 5–6 imbricate subequal segments. *Corolla* campanulate; lobes 5–6, imbricate. *Stamens* as many as the corolla-lobes and opposite to them, attached to the tube or at its base; filaments linear; anthers ovate or lanceolate, extrorse; staminodes alternating with the stamens. *Ovary* usually villous, with 5 or fewer cells; ovules on axile placentas; style cylindric; stigma small. *Fruit* an ovoid or globose fleshy berry, 5 or less-seeded. *Seeds* usually solitary; testa hard, with a prominent oblong or linear hilum; albumen fleshy; embryo with foliaceous or fleshy cotyledons.

SIDEROXYLON TOMENTOSUM, Roxb. Cor. Pl. t. 28; F. B. I. iii. 538.

N. Circars, Ganjam to Godavari, up to 4,500 ft. on Mahendragiri, Hills of Canara to Coimbatore, in dry forests.

A small tree, thorny and with small leaves in dry localities, in wet ones with larger and thinner leaves and few or no thorns. Bark thin, cracked; wood yellowish-brown, moderately hard.

Vern. *Ur.* Kanta bohul.

Var. *elengioides*, Gamble. *Sapota elengioides*, A. DC. Wt. Ic. t.

1218. *Achras elengioides*, Bedd. Fl. t. 235.

W. Ghâts, Nilgiris, Pulneys and hills of Travancore, above 5,000 ft., in Shola forests.

A small tree with rather long thorns and small leaves which are bright red in colour when young. The fruit is used in pickles and curries. Bark rough, much cracked; wood yellowish-brown, hard. Vern. *Tam.* Palai; *Badaga*, Holay.

3. *Isanandra*, Wight.

Trees with milky juice. *Leaves* alternate, entire, main nerves prominent. *Flowers* small, in clusters in the axils of present or fallen leaves, subsessile or shortly pedicelled. *Calyx*-lobes 4, 2-seriate. *Corolla* tubular campanulate; lobes 4, imbricate, somewhat twisted. *Stamens* 8, subequal, attached near the base of the corolla, 1-seriate; filaments erect; anthers lanceolate sagittate; staminodes 0. *Ovary* 4-celled, villous; style linear. *Fruit* an ellipsoid or oblong berry with a fleshy pericarp; seed usually 1 only, flattened; testa crustaceous, shining, hilum lateral; albumen fleshy; cotyledons flat, radicle inferior.

Branchlets very stout; leaf-petioles scarcely 1 in. long, leaves broadly obovate, glabrous, rounded or emarginate at apex, rounded at base, up to 3.5 in. long, 2.5 in. broad, main nerves regular parallel about 12–15 pairs, transverse nervules irregular, reticulation areolate; anthers very obtuse.....1. *villosa*.
Branchlets stout; leaf-petioles 3 in. long or longer:—

Leaves obovate, obtuse or slightly emarginate at apex; transverse nervules not or only slightly parallel, inconspicuous; anthers apiculate:—

Leaves up to 5 in. long, 2.5 in. broad, cuneate at base, main nerves regular, distant, 6–8 pairs.....2. *Stocksii*.

Leaves up to 2 in. long, 1 in. broad, cuneate at base, margin recurved; main nerves 4–6 pairs.....3. *montana*.

Leaves elliptic, obtuse or obtusely acute or emarginate, up to 3 in. long, 1.5 in. broad, the margins very slightly recurved; main nerves 8–10 pairs, regular and parallel, transverse nervules fairly distinct and subparallel; anthers with black-hispid tips.....4. *Candolleana*.

Leaves oblanceolate, obtusely acute, up to 4 in. long, 1 in. broad, the margins much recurved, main nerves 10–12 pairs, regular, transverse nervules faint; anthers with the tip sometimes villous only.....5. *Perrottetiana*. Branchlets slender; leaf-petioles 2–5 in. long; leaves lanceolate oblanceolate or oblong, obtusely, often long—and often abruptly—acuminate at apex, cuneate at base, up to 15 in. long, 3 in. broad, but usually shorter and narrower; main nerves 10–13 pairs, transverse nervules close and fairly regularly and prominently subparallel; anther tips apiculate.....6. *lanceolata*.

1. *ISONANDRA VILLOSA*, Wt. Ic. t. 360; F. B. I. iii. 538.
Deccan, Veligonda Hills of Nellore (Ramaswami); Kambakam Hills of Chingleput; W. Coast, Quilon (Wight).
A tree with thick branchlets and very coriaceous leaves, quite glabrous in spite of its name.
2. *ISONANDRA STOCKSI*, C. B. Clarke; F. B. I. iii. 539.
Deccan, N. Coimbatore, in Shola forests (Fischer).
Apparently a small tree.
3. *ISONANDRA MONTANA*, Gamble n. comb. *I. Wightiana*, A. DC. var. *montana*, Thw.; F. B. I. iii. 540.
W. Ghâts, hills of Travancore, in evergreen forests, above 4,000 ft. (Bourdillon).
A small tree with small leaves, the margins recurved.
4. *ISONANDRA CANDOLLEANA*, Wt. Ic. t. 1220; F. B. I. iii. 539.
W. Ghâts, Nilgiris and Pulneys and hills of Travancore, at about 4,000–6,000 ft., in Shola forests.
5. *ISONANDRA PERROTTETIANA*, Wt. Ic. t. 1219; F. B. I. iii. 539.
W. Ghâts, Nilgiri Hills, in Shola forests, above 4,000 ft.
6. *ISONANDRA LANCEOLATA*, Wt. Ic. t. 350; F. B. I. iii. 539.
W. Ghâts, all Districts from the Wynad southwards, in evergreen forests at about 3,000–5,000 ft.
A small tree with chartaceous leaves and prominently transverse nervules, the branchlets, buds and sometimes the under side of the leaves rusty-silky. The fruits are elongate, orange-scarlet.

Var. *anfractuosa*, C. B. Clarke. Leaves larger, more prominently obovate and acuminate, the transverse nervules usually curved to cross the main nerves; calyx- and corolla-lobes more acute.
Atapadi Hills of Malabar at 3,000 ft.; Anamalai Hills and Hills of Cochin.

Isonandra diplostemon, C. B. Clarke in F. B. I. iii. 540. *Diospyros obovata*, Wt. Ic. t. 1226. Resembles *I. villosa*, Wt., more or less, in its leaves, but the flowers are curious, having 4 calyx-lobes as in *Isonandra*, but 6 small nearly free petals and about 3 stamens to each petal. Wight's specimens are still the only ones known and the locality is not specified.

4. *Bassia*, Linn.

Trees with milky juice. Leaves coriaceous or chartaceous, petioled, usually clustered at the ends of the branchlets; stipules caducous. Flowers fascicled, crowded near the tops of the branches among the leaves or from the scars of fallen leaves; pedicels frequently reflexed.

Calyx-lobes 4, rarely 5, the 2 outer usually valvate enclosing the 2—3 inner imbricate. *Corolla* campanulate, tube broad; lobes 6—12, usually 8—10, contorted in bud, erect in flower. *Stamens* at least twice as many as the *corolla*-lobes, in one or more rows on the *corolla*-tube; *filaments* usually short; anthers lanceolate, the connective produced; staminodes 0. *Ovary* villous, 4—12-, but usually 6- or 8-celled; style subulate, elongate. *Fruit* a globose oblong or ovoid, fleshy, usually 1—3-seeded, berry. *Seeds* ellipsoid, more or less compressed; testa crustaceous, shining; *hilum* oblong or linear; albumen 0; cotyledons thick, fleshy; radicle small.

Pedicels stout, fulvous tomentose, 1—1.5 in. long; calyx-lobes also fulvous-tomentose:—

Anthers long-hairy on the back, obtuse at base, connective long-apiculate; leaves coriaceous, elliptic, up to 9 in. long, 4—5 in. broad, with about 12 pairs of main nerves, petioles long.....1. *latifolia*.

Anthers not long-hairy on the back, cordate at base, connective long-apiculate; leaves membranous, oblanceolate, tapering at base into a short fulvous-hairy petiole, the back also fulvous-hairy along the midrib, up to 12 in. long, 3 in. broad, with 20—25 pairs of main nerves.....2. *Bourdillonii*.

Pedicels glabrous:—

Pedicels slender, up to 2.5 in. long; calyx-lobes rusty-pubescent; anthers hairy on the back, cordate at base, the connective apiculate, often minutely 3-toothed; leaves chartaceous, linear-lanceolate or oblong-lanceolate, up to 7 in. long, 1.75 in. broad, with slender petioles, main nerves about 12—15 pairs.....3. *longifolia*. Pedicels moderately stout, .5—.75 in. long; calyx-lobes glabrous or nearly so; anthers glabrous, the filaments hairy, the connective long-apiculate; leaves coriaceous, shining, linear-oblong or oblanceolate, obtuse, tapering to the petiole, up to 8 in. long, 2.5 in. broad; main nerves 20 or more pairs.....4. *malabarica*.

1. *BASSIA LATIFOLIA*, Roxb. Cor. Pl. t. 19; F. B. I. iii. 544; Bedd. Fl. t. 41.

N. Circars, in deciduous forests, especially in Godavari; Deccan, in deciduous forests, especially the Nallamalai Hills and south to N. Arcot, Salem and Coimbatore. Elsewhere much planted and liable to run wild. The Mahua tree.

A large and handsome deciduous tree, one of the most important, in some respects the most important, of Indian trees. The large fleshy cream-coloured corollas contain much sugar and are an important article of food, and for the distillation of spirit. They fall readily from the trees when ripe, and can be collected under them. The large ovoid greenish fruits have large fleshy cotyledons which give a valuable oil. Bark thick, grey; wood very hard, reddish-brown, of good quality, but little used. Vern. *Hind*. Mahua; *Ur*. Moha, Moholo; *Tel*. Ippa; *Tam*. Illupei; *Kan*. Ippi.

2. *BASSIA BOURDILLONII*, Gamble in Kew Bull. 1921, 121. *B. fulva*, Bourd. Trav. Trees, 238, not of Bedd.

W. Gháts, Ariankavu and Shendurni valleys of Travancore, at low levels up to 1,000 ft. (Bourdillon).

A medium-sized tree with large yellowish-white corollas, large leaves in close terminal whorls and a large green ovoid fruit. Bark greyish-brown; wood pinkish-brown, moderately hard, apparently of good quality. Vern. *Mal*. Thandidiyan.

3. *BASSIA LONGIFOLIA*, Linn.; F. B. I. iii. 544; Wt. Ill. t. 147 Bedd. Fl. t. 42.

W. Coast, dry forests of S. Canara, Malabar and Travancore, at low elevations; elsewhere, especially in the Carnatic, cultivated only.

A large tree, the flowers appearing with the leaves, corollas pale yellow and fleshy, with the same uses as with *B. latifolia*, as is also the case with the seeds. Bark dark yellowish-grey; wood red, close-grained, similar to that of Mahua. Vern. *Tel.* Ippa; *Tam.* Illupei; *Kan.* Ippi; *Mal.* Ellupi.

4. *BASSIA MALABARICA*, Bedd.; F. B. I. iii. 544.

W. Coast and W. Ghâts, along streams, from S. Canara to Travancore and Tinnevely, Mysore hills and Anamalais, up to 4,000 ft.

A large tree with yellowish white flowers and oblong-lanceolate fruit. Bark dark brown; wood dark red, hard. Vern. *Tam.*, *Mal.* Atta illupei.

5. *Palaquium*, Blanco.

Trees with milky juice. *Leaves* usually coriaceous, petioled, entire. *Flowers* fascicled in the axils of the leaves or of the scars of fallen leaves, pedicellate. *Calyx*-lobes 6, in 2 series, the outer 3 valvate, the inner 3 imbricate. *Corolla* campanulate, tube short, lobes 6, imbricate or contorted in bud. *Stamens* 12 or more, up to 18, attached to the base of the corolla, 1-seriate or the alternate ones rather higher up; anthers ovate-lanceolate, extrorse, the connective produced; staminoodes 0. *Ovary* villous, 6-celled; style subulate. *Fruit* a fleshy ovoid or ellipsoid berry, 1—2-seeded. *Seeds* large; testa crustaceous, albumen 0; cotyledons thick, fleshy.

Leaves elliptic or elliptic-obovate, up to 4 in. long, 2 in. broad, shortly and obtusely acute the apex twisted, dark green when fresh, nearly black when dry; pedicels 1—1.5 in. long, usually single or in pairs; corolla .5 in. long; anthers long-apiculate, hairy at tip.....1. *ellipticum*.
Leaves lanceolate or oblanceolate, up to 8 in. long, 3 in. broad, shortly and obtusely acute, light green when fresh, grey when dry; pedicels up to .5 in. long, single or in pairs; corolla about .25 in. long; anthers acute, not hairy at tip
 2. *Bourdillonii*.

1. *PALAEQUIMUM ELLIPTICUM*, Engler. *Dichopsis elliptica*, Benth.; F. B. I. iii. 542. *Bassia elliptica*, Dalz.; Bedd. Fl. t. 43.

W. Ghâts, in all Districts, in evergreen forests, at 1,000—4,000 ft. A lofty tree sometimes reaching 100 ft. in height with a straight but fluted stem, the flowers white and fragrant, the berry up to 1.5 in. long, ellipsoid, green. Bark brown, mottled with white; wood reddish brown, moderately hard, used in building but especially for shingles. It gives a poor quality of gutta percha of little value. Vern. *Tam.* Kat illupei; *Mar.* Panchoti; *Mal.* Pala.

2. *PALAEQUIMUM BOURDILLONI*, Brandis in Ind. Trees, 424.

Travancore, in evergreen forests, up to 4,000 ft. (*Bourdillon*). A medium-sized tree.

6. *Mimusops*, Linn.

Trees with milky juice. *Leaves* chartaceous or coriaceous, with many usually inconspicuous parallel main nerves. *Flowers* axillary, pedicelled, solitary or fascicled. *Calyx*-lobes 6 or 8, in 2 series, the outer valvate enclosing the inner imbricate. *Corolla*-tube short; lobes 18 or 24 or more in 2 rows, one-third in the inner, the rest in the outer row. *Stamens* 6 or 8 attached to the corolla-tube opposite the inner lobes; filaments short, free or connate in a tube with the staminodes; anthers lanceolate, extrorse, apiculate; staminodes subpetaloid, usually fimbriate. *Ovary* hirsute, 6—8-celled; style subulate. *Fruit* a globose ovoid or ellipsoid berry, epicarp crustaceous. *Seeds* few or solitary, obliquely ovate or oblong, slightly compressed; hilum basal or lateral; albumen fleshy; cotyledons flat.

Calyx-lobes 8, *stamens* 8; *staminodes* lanceolate, acuminate, fimbriate, pilose; *leaves* chartaceous or coriaceous, elliptic, shortly acuminate at apex, rounded or narrowed at base, glabrous, up to 7 in. long, 3 in. broad, but usually smaller; *berry* ovoid, yellow, about 1 in. long.....1. *Elengi*.

Calyx-lobes 6, *stamens* usually 6, sometimes 8; *leaves* coriaceous:—

Flowers small, the corolla under 2 in. long; *staminodes* short, glabrous, lanceolate, bifid or fimbriate; *leaves* elliptic-obovate, obtuse or emarginate, up to 4 in. long, 2 in. broad; *berry* ellipsoid, reddish-yellow, about 4 in. long...2. *hexandra*. *Flowers* rather large, the corolla 4 in. long; *staminodes* long, lanceolate, fimbriate, glabrous; *leaves* elliptic, obtuse or emarginate, up to 2.5 in. long, 1.5 in. broad; *berry* globose, depressed, about .75 in. long.....3. *Roxburghiana*.

1. *MIMUSOPS ELENGI*, Linn.; F. B. I. iii. 548; Roxb. Cor. Pl. t. 14; Wt. Ic. t. 1586; Bedd. Fl. t. 40.

Carnatic, in dry evergreen forests from the Kistna southwards, common; Deccan, in ravines in the hills and up to 4,000 ft.; W. Coast and lower Gháts, in moist evergreen forests, scarce; common everywhere in cultivation.

A small tree with rather small leaves scarcely 3 in. long in dry forests, a large one with much larger leaves in damp localities. Bark dark grey, rough, deeply fissured; wood dark red, very hard and close-grained, used for building, carts and implements. The scented white corollas which fall off in showers are made into garlands. The seeds give an oil. Vern. *Hind.* Malsari; *Ur.* Kirakuli; *Tel.* Pogada; *Tam.* Mahila, magadam; *Mal.* Elengi.

2. *MIMUSOPS HEXANDRA*, Roxb. Cor. Pl. t. 15; F. B. I. iii. 549. *M. indica*, A. DC.; Wt. Ic. t. 1587.

N. Circars and Carnatic from the Chilka Lake southwards, chiefly in dry evergreen forests, inland to the scarp of the Deccan plateau, more scarce to the westward and absent from the W. Coast.

A small tree in dry evergreen forests as in India, a large tree in Ceylon. Bark grey, smooth, often with conical hard degenerate branchlets; wood red, very hard and close-grained. Vern. *Ur.* Khiri; *Tel.* Pala; *Tam.* Palla.

3. *MIMUSOPS ROXBURGHIANA*, Wt. Ic. t. 1588; F. B. I. iii. 548.

Deccan and Carnatic, in dry forests as in the Yerramalai Hills of Kurnool, the hills of N. Coimbatore and N. Nilgiri slopes, southwards to Tinnevely and in Travancore in the southern forests, up to 5,000 ft.

A large evergreen tree. Wood reddish-brown and strong, used in building. Vern. *Tam.* Kanapalei; *Kan.* Renga.

M. Kauki, Linn., is a tree of the Malay Peninsula, sometimes found in gardens.

Family XCV. EBENACEAE.

Trees or shrubs, usually with hard wood, often black in the centre. *Leaves* alternate, rarely subopposite, entire, usually coriaceous, stipules 0. *Flowers* usually dioecious, regular, axillary, cymose or solitary, bracteate; pedicels articulate under the flower. *Calyx* inferior, gamosepalous, often accrescent. *Corolla* gamopetalous, lobes 3—7, contorted, sometimes imbricate or valvate in bud. *Stamens* in ♂ flowers as many or 2—3-times as many as the corolla-lobes or ∞; filaments free or paired or variously connate; anthers basifixed usually dehiscing longitudinally, rarely apically, connective often produced; in ♀ flowers absent or reduced to staminodes. *Disk* usually 0. *Ovary* superior, sessile; styles 2—8; ovules as many or twice as many as the styles, attached to the inner angles of the cells; in ♂ flowers 0 or rudimentary. *Fruit* a coriaceous or fleshy berry, several- or few-seeded. *Seeds* pendulous, usually oblong; testa thin or coriaceous; albumen copious, uniform or ruminate; embryo axile; radicle superior.

Flowers 3-merous; ovary 3- or 6-celled.....1. *Maba*.
Flowers 4—5-merous; ovary 4—5- or 8—10-celled.....2. *Diospyros*.

1. *Maba*, Forst.

Trees or shrubs. *Leaves* alternate, entire. *Flowers* dioecious, axillary, shortly pedicelled or in small dense cymes, usually 3-rarely 4- or 5-merous. *Calyx* 3-, rarely 4—5-lobed, often cup-shaped and enlarged in fruit. *Corolla*-tube usually longer than the calyx; lobes 3, twisted to the right in bud. *Stamens* in ♂ flowers 3—22; filaments distinct, paired or polyadelphous; in ♀ flowers 0 or up to 12 staminodes. *Ovary* in ♀ flowers 3-celled or imperfectly 6-celled, ovules 6; style-arms 3; in ♂ flowers rudimentary only. *Fruit* globose or ellipsoid, glabrous or hairy; 1—6-celled and 1—6-seeded, dry or fleshy. *Seeds* albuminous, the albumen equable; embryo axile; cotyledons flat.

Fruit globose, glabrous; branchlets glabrous:—

Flowers minute, calyx .1 in. long, corolla of ♂ .15 in., of ♀ .2 in. long; leaves obovate, coriaceous, rounded or emarginate at apex, under 1 in. long; fruit 3—4 in. in diam., 1—2-seeded; stamens usually 6, anthers lanceolate.....1. *buxifolia*.

Flowers small but larger, calyx .2 in. long, corolla of ♂ or ♀ .3—4 in. long; leaves elliptic-lanceolate, chartaceous, acuminate usually obtusely at apex, 1—3 in. long; fruit 4—5 in. in diam., 1—3-seeded; stamens 6—10, anthers linear.....2. *neilgerrensis*.

Fruit ellipsoid, with fulvous hairs when young; branchlets fulvous-hairy as are the calyx- and corolla-lobes on the back; calyx .2 in. long, corolla of ♀ .3 in.; leaves elliptic-lanceolate, coriaceous, obtusely acute at apex, 1—3 in. long, .5—1 in. broad; fruit ellipsoid, fulvous hairy when young.....3. *nigrescens*.

1. *MABA BUXIFOLIA*, Pers.; F. B. I. iii. 551; Wt. Ic. t. 763. *Ferreola buxifolia*, Roxb. Cor. Pl. t. 45.

N. Circars and Carnatic to S. Travancore, especially near the coast and on laterite, common in dry evergreen forests; Deccan,

in dry forests in Kurnool, Cuddapah, N. Arcot and S. Arcot, more scarce westwards.

A large bushy shrub or more rarely a small tree, with red fruit. Bark thin, grey to black; wood grey with darker streaks, hard and close-grained. Vern. *Ur.* Guakoli; *Tel.* Alli, Uti; *Tam.* Iramballi.

2. *MABA NEILGERRENSIS*, Wt. Ill. t. 148 *bis* E, Ic. tt. 1228, 1229. *M. buxifolia*, C. B. Clarke; F. B. I. iii. 551, *in part*, not of Pers.

W. Gháts, Nilgiris, Pulneys and hills of Tinnevely, at 5,000—6,000 ft., in Shola forests; hills of N. Coimbatore.

A small tree.

3. *MABA NIGRESCENS*, Dalz.; F. B. I. iii. 551.

W. Gháts, hills of S. Canara and Mysore (Law).

A large shrub or small tree.

2. *Diospyros*, Linn.

Trees, rarely shrubs. *Leaves* alternate or sometimes subopposite, entire. *Flowers* dioecious, rarely polygamous, axillary or on old branches, in cymes or, especially the ♀, solitary; usually 4—5-merous, rarely 3-merous; bracts sometimes conspicuous. *Calyx* lobed, usually deeply, rarely truncate, the ♀ often larger than the ♂ and often accrescent and plicate or auriculate in fruit. *Corolla* tubular urceolate campanulate or salver-shaped, the lobes twisted to the right in bud. *Stamens* in ♂ flowers 4—many, often 16, the filaments distinct, paired or variously connate; anthers usually linear or lanceolate, rarely short; in ♀ flowers staminodes 0—16. *Ovary* in ♀ 4—5-celled or sometimes 8—10-celled, ovules solitary, rarely 2 in each cell; styles or stigmas 1—4; in ♂ flowers rudimentary or 0. *Fruit* globose ellipsoid or ovoid-conic, often supported by the enlarged sometimes woody calyx; flesh often pulpy or viscid. *Seeds* oblong, usually compressed, albumen equable or ruminate; cotyledons thin, flat.

FLORA
OF THE
PRESIDENCY OF MADRAS

BY
J. S. GAMBLE, C.I.E., M.A., F.R.S., F.L.S.
LATE OF THE INDIAN FOREST DEPARTMENT

PART V
EBENACEAE TO SCROPHULARIACEAE

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CALCUTTA

1956

INTRODUCTION TO PART V.

THIS Part has to end in the middle of the Family *Scrophulariaceæ* ; the rest will come at the beginning of Part VI.

The Supplementary Note dealing with some points in Part IV which have seemed to require explanation appeared as No. IV in the 'Kew Bulletin' for 1921, p. 312.

J. S. GAMBLE.

Liss : January, 1923.

Seeds with ruminant albumen:—

Calyx-lobes of ♀ flowers 4—5, cordate, the margins wavy, forming in fruit a very shallow cup; leaves alternate or subopposite; ♂ flowers in short cymes densely tawny-tomentose, ♀ solitary; fruit globose:—

Leaves elliptic, narrowed at both ends, nerves and reticulations raised above, up to 6 in. long, 2.5 in. broad, but irregular, those of coppice shoots up to 15 in. by 6 in.; fruit pubescent when young, afterwards glabrous, with crustaceous pericarp; seeds oblong, compressed, 6—7 in. long.....1. *Melanoxylon*.

Leaves broadly ovate, rounded at base, obtuse or slightly acute at apex, nerves and reticulations of mature ones prominently impressed above, up to 8 in. long, 3—4 in. broad; fruit glabrous, the pericarp leathery; seeds shortly oblong, slightly compressed, .5 in. long.....2. *tomentosa*.

Calyx-lobes of ♀ flowers 4, having the tube enlarged in fruit in a large woody cup, the lobes reflexed, wavy; ♂ flowers in clusters, ♀ 1—3 together; fruit ovoid-globose, 1.5 in. in diam.; leaves large, coriaceous, oblong-lanceolate, acuminate, up to 12 in. long, 3—6 in. wide, the transverse nervules prominent and subparallel.....3. *insignis*.

Calyx-lobes of ♀ flowers 4, rounded, reflexed and accrescent in fruit, not wavy; of ♂ very small; ♂ flowers in cymes about .5 in. long, ♀ solitary (sometimes apparently racemose, by the absence of leaves); fruit globose, .5 in. in diam.; seeds boat-shaped; leaves elliptic, black when dry, shining, acute or acuminate, up to 7 in. long, 3.5 in. broad.....4. *sylvatica*.

Calyx-lobes of ♀ flowers 5, ovate, the margins strongly reflexed, accrescent in fruit, not wavy, of ♂ small, acute:—

♂ flowers as well as ♀ in close axillary fascicles, densely tawny-tomentose; fruit ovoid, pointed, .75 in. long, seeds oblong, shining, wrinkled, .5 in. long; leaves elliptic oblong, shortly and obtusely acuminate, coriaceous, the nerves inconspicuous, 3—8 in. long, 1.5—3 in. broad.....5. *Candolleana*.

♂ flowers in few-flowered pedunculate cymes, ♀ solitary, pedunculate, both nearly glabrous; fruit globose, 1 in. in diam.; seeds ovoid, shining, transversely striate; leaves narrowly elliptic-oblong, obtusely acute at apex, narrowed at base, coriaceous, shining, up to 3.5 in. long, 1.5 in. broad.....6. *affinis*.

Seeds with the albumen not ruminant:—

Calyx only shortly lobed, often truncate in fruit:—

Calyx-lobes of ♂ and ♀ similar, short, obtuse and ciliate:—

Calyx-lobes of ♀ not enlarged in fruit, but still lobed; branchlets pubescent; leaves elliptic or lanceolate, obtusely acuminate, membranous, rounded at base, up to 4 in. long, 1.5 in. broad, nerves not prominent, 6—8 pairs, petiole .1—2 in. long; fruit globose or ovoid.....7. *humilis*.

Calyx-lobes of ♀ enlarged in a truncate cup; branchlets glabrous; leaves ovate, obtusely acuminate, chartaceous, the base narrowed or broadly obtuse or subcordate, up to 5 in. long, 3 in. broad, nerves about 6—8 pairs spreading, petiole .3—5 in. long; fruit oblong-ellipsoid.....8. *oocarpa*.

Calyx-lobes of ♂ very short, of ♀ much enlarged in fruit, coriaceous and folded; branchlets appressed pubescent; leaves lanceolate, the apex abruptly but obtusely produced, the base acute, coriaceous, minutely reticulate, up to 3 in. long, 1 in. broad, petiole .2—3 in. long; fruit globose, pubescent.....9. *Barberi*.

Calyx deeply lobed:—

Fruit ovoid-conical, fulvous hirsute; calyx-lobes nearly free, ♂ and ♀ similar, recurved in fruit; branchlets fulvous-hirsute; leaves elliptic or elliptic-oblong, acute, membranous, rounded or cordate at base, fulvous-hirsute beneath, up to 5 in. long, 2 in. broad, petiole .15 in. long.....10. *pruriens*.

Fruit globose or ovoid:—

Flowers peduncled, ♂ in cymes, ♀ solitary; calyx-lobes accrescent, large and foliaceous in fruit, ovate-cordate:—

Cymes of ♂ flowers lax with slender peduncles and pedicels, flowers 4-merous; anthers 12—16, elongate apiculate, in pairs on a disk surrounding the rudimentary ovary; leaves narrowly lanceolate, obtusely acuminate, minutely reticulate, coriaceous, up to 4 in. long, 1 in. broad.....11. *foliolosa*.

Cymes of ♂ flowers stout curved, prominently bracteate; flowers 5-merous; anthers 20, linear, acute, in pairs on the corolla; leaves oblong or oblong-

lanceolate, obtusely acuminate, subcoriaceous, minutely reticulate, up to 9 in. long, 3 in. broad.....12. *paniculata*.

Flowers short peduncled, in close cymes or fascicles:—

Corolla tubular, often salver-shaped:—

Stamens glabrous, anthers many, usually in groups of 3 or more; fruiting calyx-tube forming a woody cup with the lobes beneath recurved:—

Calyx glabrous except for marginal ciliae in ♂; leaves elliptic, obtuse at apex or sometimes emarginate, obtusely attenuate at base, coriaceous, shining, up to 4 in. long, 2 in. broad, reticulation minute and prominent; anther-connective crested or apiculate.....13. *Ebenum*.

Calyx pubescent and ciliate; leaves elliptic-oblong, acuminate, somewhat rounded at base, membranous to chartaceous, up to 6 in. long, 2-2.5 in. broad, not minutely reticulate, lowest pair of main nerves usually opposite and from the base; anthers with the connective not produced.....14. *assimilis*.

Stamens with the filaments villous, anthers 16, in pairs; leaves lanceolate or oblong-lanceolate, acuminate, attenuate at base, the margins reflexed, coriaceous, up to 6 in. long, 1-2 in. broad, nerves obscure; calyx-lobes with recurved margins.....15. *nilagirica*.

Corolla campanulate or urceolate; stamens 16, in two rows the inner smaller:—

Fruiting calyx large, flattened, coriaceous, foliaceous:—

Leaves ovate or elliptic, 2-6 in. long, 1-3 in. broad, obtuse or subacute at apex, obtuse or sometimes nearly cordate at base, at first pubescent then glabrous; anthers awned; staminodes in ♀ 4; fruit globose, 1-1.5 in. in diam., reddish-brown.....16. *montana*.

Leaves oblong-lanceolate, 1.5-3 in. long, .5-7.5 in. broad, obtuse at apex, rounded or cordate at base, softly pubescent on both sides; anthers not awned; staminodes in ♀ 12; fruit globose, .5-1 in. in diam., yellow.....17. *cordifolia*.

Fruiting calyx small, little enlarged, submembranous:—

Leaves elliptic or obovate, thinly coriaceous, obtuse or subacute at both ends, 1-2.5 in. long, .5-1 in. broad, slightly pubescent above, fulvous hairy beneath; anthers acute; staminodes in ♀ 8; fruit globose, .3 in. in diam.....18. *Chloroxylon*.

Leaves elliptic-ovate, acute at both ends, .75-2 in. long, .5-1 in. broad, glabrous above, pubescent beneath; anthers ovate, at first dehiscent at the apex, later further down; staminodes in ♀ 0; fruit oblong, .3-7 in. long.....19. *microphylla*.

Fruiting calyx slightly enlarged, thickened and reflexed in fruit; both ♂ and ♀ flowers clustered on the branchlets, tubular-campanulate, short; leaves elliptic, obtuse, coriaceous, up to 5 in. long, 2.5 in. broad, nerves prominent, irregular; fruit globose, .7 in. in diam., the reflexed calyx fulvous tomentose.....20. ovalifolia.

Corolla ovoid-urceolate; stamens very many, usually about 40, anthers linear, the connective villous also the short filaments; fruiting calyx much enlarged, spreading or reflexed; leaves oblong, very coriaceous, glabrous, the main nerves oblique, reticulation prominent, up to 12 in. long, 3 in. broad; fruit globose, often 3 in. in diam., reddish-velvety

21. *peregrina*.

Flowers sessile, 5-merous, both ♂ and ♀ in close clusters in the axils of the leaves or of the scars of fallen leaves, surrounded by many bracts, all fulvous-tomentose; stamens 10-12, the anthers lanceolate acuminate; staminodes in ♀ 5; leaves oblong or lanceolate, acuminate, rounded and then decurrent at base, coriaceous, up to 8 in. long, 3-5 broad, the nerves obscure

22. *sulcata*.

Flowers 5-merous, ♂ in short axillary cymes, ♀ in short thick-peduncled and -pedicelled cymose often very dense clusters on old wood; stamens 12-18; staminodes in ♀ 10; leaves oblong-lanceolate, long acuminate, cuneate at base, glabrous, coriaceous, up to 6 in. long, 2 in. broad, main nerves 6-8 pairs, transverse nervules subparallel; fruit globose, very large, 3 in. in diam.

23. *Bourdillonii*.

Calyx spathaceous, irregularly lobed; leaves ovate- or lanceolate-oblong, up to 11 in. long, 4 in. broad, coriaceous, shining, minutely and conspicuously reticulate
24. *Toposia*.

1. DIOSPYROS MELANOXYLON, Roxb. Cor. Pl. t. 46; F. B. I. iii. 564. *D. dubia*, Wall.; Wt. Ic. t. 1223. *D. exsculpta*, Bedd. Fl. t. 66 (except calyx of ♀). *D. Wightiana*, Wall.; Bedd. Fl. t. 67. *D. Tupru*, Buch.-Ham.; F. B. I. iii. 563.
N. Circars, scarce; Deccan and Carnatic, common, in all deciduous forests, on dry rocky hills and on waste lands, in the hills up to 3,000 ft.
A moderate-sized deciduous tree, the young leaves and branchlets and the ♂ inflorescence tawny-tomentose. Bark greyish-black, cleft in rectangular plates showing the black inner bark in the clefts; wood hard reddish-brown with an irregular black heartwood. This ebony is however not much used, as pieces of it are not obtainable of any large size. The fruit is edible. Vern. *Tel.* Tumi, tumki; *Mar.* Tendu.
2. DIOSPYROS TOMENTOSA, Roxb.; F. B. I. iii. 564; Wt. Ic. tt. 182, 183.
N. Circars down to the Godavari, in deciduous forests.
A large tree in good forests, a small one in scrub jungle, reproducing itself on cultivated lands from root-suckers, the leaves large and thick. Bark greyish-black, cleft in regular scales, the inner bark quite black; wood very hard, dark reddish-brown with an irregular black heart-wood, occasionally streaked with purple or brown. The ebony is, however, not much utilised though large trees give good pieces. It is chiefly used for small articles of ornament. The fruit is edible. Vern. *Hind.* Tendu; *Ur.* Kendhu.
3. DIOSPYROS INSIGNIS, Thw.; F. B. I. iii. 565; Bedd. Ic. t. 130.
W. Gháts, Anamalais and hills of Travancore at low elevations in the evergreen forests.
A lofty tree with yellowish-white flowers and large fruit in a curious woody cup.
4. DIOSPYROS SYLVATICA, Roxb. Cor. Pl. t. 47; F. B. I. iii. 559; Bedd. Ic. t. 121.
N. Circars, in forests, down to the Godavari; W. Gháts, in evergreen forests in all Districts on the W. side, up to 5,000 ft.
A moderate-sized tree with small ♂ flowers having a short urceolate corolla-tube, prominent ♀ calyx-lobes and a small fruit. Bark thin, blackish-grey; wood grey with black streaks and irregular black patches. Vern. *Ur.* Kanchia, Kaluchia; *Tel.* Tella gada; *Kan.* Kaka suoli.
5. DIOSPYROS CANDOLLEANA, Wt. Ic. tt. 1221, 1222; F. B. I. iii. 566. *D. canarica*, Bedd. Ic. t. 134.
N. Circars, Mahendragiri Hill in Ganjain, at 4,500 ft.; W. Gháts, in evergreen forests from S. Canara to Travancore, up to 1,500 ft.
A moderate-sized tree with pale yellow flowers, the ♂ corollas elongate, the fruit green. Bark smooth, greenish-black; wood

light pink with grey streaks, no ebony. Vern. *Mal.* Kari; *Mar.* Karamara.

6. *DIOSPYROS AFFINIS*, Thw.; F. B. I. iii. 566; Bedd. Ic. t. 127.
W. Gháts, hills of Tinnevely (Beddome).
A moderate-sized tree with yellowish-white flowers. Bark black, peeling off in irregular patches; wood with small black heartwood streaked with brown.
7. *DIOSPYROS HUMILIS*, Bourd. in Journ. Bomb. Nat. Hist. Soc. xii. 352, t. 4. *D. orixensis*, Wt.; F. B. I. iii. 571, *not of* Willd.
W. Gháts, evergreen forests of Travancore and Tinnevely, about 2,000 ft.
A small tree reaching 30 ft. in height with white flowers and green fruit 5—75 in. in diam. The anthers are small and rounded. Bark black, mottled green and dark grey; wood hard, dull greyish-brown streaked with black, and with black patches. Vern. *Tam.* Vellei thuvarei; *Mal.* Meruvalan.
8. *DIOSPYROS OOCARPA*, Thw.; F. B. I. iii. 560.
Bababudan Hills of Mysore (Law); W. Gháts, Anamalais and hills of Travancore up to 2,000 ft., in evergreen forests.
A small or moderate-sized tree with shining leaves, black when dry, very small flowers, and an ellipsoid oblong fruit, about 1 in. long, cylindric when young. Bark yellowish; wood greyish-brown with an irregular purplish-black streaked heartwood. Vern. *Mal.* Vellei karunkali.
9. *DIOSPYROS BARBERI*, Ramas. in Journ. As. Soc. Beng. x. 2 (1914), 47, tt. 3, 4.
Hills of Tinnevely and Travancore, in evergreen forests, at 2,000—4,000 ft.
A small tree with ♂ flowers in short cymes, ♀ solitary with large leathery folded foliaceous calyx-lobes.
10. *DIOSPYROS PRURIENS*, Dalz.; F. B. I. iii. 553; Bedd. Ic. t. 129.
W. Gháts, evergreen forests of S. Canara, Wynaad, Anamalais and hills of Tinnevely, up to about 3,000 ft.
A small tree with softly hirsute branchlets, leaves and calyx, the fruit ovoid conical up to 1 in. long and clothed with fulvous stinging hairs.
11. *DIOSPYROS FOLIOLOSA*, Wall.; F. B. I. iii. 556. *D. calycina*, Bedd. Fl. t. 68, Ic. t. 123.
W. Gháts, forests of Tinnevely and S. Travancore, up to 3,000 ft.
A moderate-sized tree, conspicuous in fruit from the large foliaceous calyx-lobes, flowers bright yellow. Fruit yellow when dry, about 1 in. in diam, the seeds almost ruminant. Bark dark brown, smooth; wood yellowish-white, clouded with grey and black, hard. Vern. *Tam.* Vellei thuvarei.
12. *DIOSPYROS PANICULATA*, Dalz.; F. B. I. iii. 570; Bedd. Ic. t. 125.
W. Gháts, evergreen forests of Malabar and Travancore, up to 3,000 ft.
A handsome tree of moderate size with greenish white ♂ flowers in pedunculate prominently bracteate cymes, the ♀ solitary re-

curved, the corolla tawny-villous; the fruit ovoid, green, 1 in. long. Bark black, rough; wood soft, white and grey in irregular patches with narrow stripes of black. Vern. *Tam.* Karun thuvarei; *Mal.* Kari, Karivella, Illakatta.

13. *Diospyros ebenum*, Koenig; F. B. I. iii. 558; Wt. Ic. t. 188; Bedd. Fl. t. 65.

Deccan and Carnatic, in dry evergreen forests, extending W. to N. Coimbatore and S. to Tinnevely. Ebony.

A large or moderate-sized tree with greenish-yellow flowers and subglobose fruit 75 in. in diam. seated on a woody cup. Bark dark grey, finely cracked longitudinally; wood very hard, sapwood grey, heartwood jet black, the ebony wood of India but very little utilised except for small articles and inlaying. A "Royal timber" in Travancore. Vern. *Tel.* Nalluti; *Tam.* Acha, Tumbi, Karun kali; *Kan.* Karemara.

14. *Diospyros assimilis*, Bedd. in Madras For. Rep. 1866—7, p. 20, t. 1; F. B. I. iii. 558. *D. nigricans*, Dalz.; Bedd. Ic. t. 124.

N. Circars, Palkonda Hills of Vizagapatam (Gamble); W. Gháts, S. Canara to Travancore, at 1,000—3,000 ft., in evergreen forests. A large evergreen tree with pale yellow flowers and globose fruit. Bark black, thin, much cracked; wood hard, sapwood greyish-white, heartwood jet black streaked with grey and brown, much valued in Travancore and considered a "Royal timber" like that of *D. ebenum* (Bourdillon). Vern. *Tam.* Karunthali; *Mal.* Karu, Mushtimbi.

15. *Diospyros nilagirica*, Bedd. Ic. t. 136; F. B. I. iii. 566.

W. Gháts. W. slopes of Nilgiris, 3,000—4,500 ft. (Beddome), Anamalais and to the hills of Travancore, 3,000—5,000 ft., common about Peermerd.

A moderate-sized evergreen tree with yellowish-white 4-merous flowers and smooth globose green fruit, 1 in. in diam. Bark black; wood brownish-yellow, moderately hard. Vern. *Tam.* Karu.

16. *Diospyros montana*, Roxb. Cor. Pl. t. 48; F. B. I. iii. 555; Wt. Ic. t. 1225.

N. Circars, Deccan and Carnatic in deciduous forest, westwards to the E. slopes of the Gháts, at low levels. Common, but nowhere very abundant.

A small or moderate-sized, sometimes thorny, deciduous tree with greenish flowers and reddish-brown fruit. Bark thin, grey or greyish-black; wood grey tinged with yellow or brown, with darker patches, moderately hard, very little used. Vern. *Hind.* Tendu; *Ur.* Kosse kuli; *Tel.* Yerragoda.

17. *Diospyros cordifolia*, Rox. Cor. Pl. t. 50; Wt. Ill. t. 148, *D. montana*, var. *cordifolia*, C. B. Clarke; F. B. I. iii. 555.

N. Circars, Deccan and Carnatic, westwards to the dry slopes of the Gháts, and up to 2,000 ft., in dry deciduous or evergreen forests.

A small, thorny, branching deciduous tree with small white flowers and yellow fruit. Bark light greyish-brown; wood reddish or yellowish-white, moderately hard. Vern. *Tel.* Vackana.

18. *DIOSPYROS CHLOROXYLON*, Roxb. Cor. Pl. t. 49; F. B. I. iii. 560. *D. capitulata*, Wt. Ic. tt. 1224, 1588 bis.

N. Circars, Deccan and Carnatic, in dry evergreen forests, especially on laterite, common.

A large much-branched shrub, often thorny, in dry localities with small leaves, in better soils a small tree with larger leaves. Flowers, especially ♂, very small; fruit globose, 2—3 in. in diam., edible. Bark dark brown, peeling off in small scales; wood yellowish-grey, moderately hard, a good fuel. Vern. *Ur.* Kosai; *Tel.* Illinda, Nella ulimira.

19. *DIOSPYROS MICROPHYLLA*, Bedd. Ic. t. 133; F. B. I. iii. 559.

W. Ghâts, evergreen forests of S. Canara, Malabar and Travancore, also of the Anamalais, up to 3,000 ft.

A large tree with black cylindric stem flecked with white, the young branches with long yellow hairs, the leaves small, the flowers minute, white, 4—5-merous. Wood reddish-grey, hard and close-grained, apparently not used. Vern. *Tam.* Chinna thuvarei; *Mal.* Thovara kari.

20. *DIOSPYROS OVALIFOLIA*, Wt. Ic. t. 1227; F. B. I. iii. 557.

Deccan and Carnatic in most hilly regions in Nellore, Cuddapah, Kurnool, Trichinopoly, westwards to the drier slopes of the Ghâts and to S. Travancore, in dry forests at low levels.

A small evergreen tree with whitish flowers on the branchlets said to have a heartwood streaked with black. Vern. *Tam.* Vedukka nari.

21. *DIOSPYROS PEREGRINA*, Gürke in Engl. und Prantl. Naturl. Pflzm. iv. i. 164. *D. Embryopteris*, Pers.; F. B. I. iii. 556; Bedd. Fl. t. 69.

Embryopteris glutinifera, Roxb. Cor. Pl. t. 70; Wt. Ic. tt. 843, 844.

N. Circars, in hill forests, chiefly along streams; W. Coast, on river banks and backwaters, extending into the valleys of the Ghâts; often cultivated.

A branching evergreen tree with large coriaceous leaves which are bright red when young, yellowish flowers and a large red velvety fruit with a viscid pulp used for paying the seams of boats. Bark dark grey, smooth; wood grey with darker streaks. Vern. *Hind.* Gáb; *Ur.* Gusva kendhu; *Tel.* Tumika; *Tam.* Tumbika; *Mal.* Paniccha.

Var. *atrata*, Thw. Buds and flowers covered with close black hairs. Leaves smaller. Evergreen forests of Travancore at about 4,000 ft. (Bourdillon).

22. *DIOSPYROS SULCATA*, Bourd. For. Trees Trav. 255.

W. Ghâts, evergreen forests of Travancore at low elevations (Bourdillon).

A small tree with large leaves and flowers in sessile clusters with many bracts; fruit truncate-conical, 1 in. broad, 25 in. long, at first rusty-tomentose, deeply grooved with 8—10 grooves.

Bark blackish-grey, smooth; wood brownish pink with occasional lines of black. Vern. *Mal.* Kari.

23. *Diospyros BOURDILLONI*, Brandis Ind. Trees, 435, 713.

W. Ghâts, Anamalais and hills of Tinnevely and Travancore, in evergreen forests up to 2,500 ft.

A large tree with a black rough fluted stem and thick drooping foliage; flowers white; fruiting calyx cup-like, with short pointed lobes. Bark black; wood yellowish-grey with irregular rings of black and brown. Vern. *Tam.* Karun chatthi; *Mal.* Kari, Kodal, Therikka.

24. *Diospyros TOPOSIA*, Buch.-Ham.; F. B. I. iii. 556; Bedd. Ic. t. 122 (poor!).

Evergreen forests of Tinnevely and Travancore, up to 3,000 ft.

A large tree with large closely reticulate leaves, pale yellow 4-merous flowers and a large ovoid green pubescent fruit. Said, in Ceylon, to have a small black heartwood.

Diospyros philippensis, Gürke, *D. discolor*, Willd., is a tree with large oblong coriaceous leaves and large globose brown-hairy edible fruit, which is frequently met with in gardens. It is a native of the Philippine Islands.

Family XCVI. SYMPLOCACEAE.

Trees or shrubs. *Leaves* alternate, simple, sessile or shortly petioled; stipules 0. *Flowers* hermaphrodite, regular, axillary or terminal, solitary or in simple or compound spikes or racemes; bracts usually solitary at the base of each pedicel, bracteoles 1–3, both usually early caducous. *Calyx*-tube adnate to the ovary, lobes 5, imbricate. *Petals* 5 in 1 series or more in 2 series, usually free or shortly connate at the base, sometimes connate in a tube, imbricate. *Stamens* usually numerous, many-seriate, adnate to the corolla-tube or the petals, most usually in groups; filaments filiform or flattened; anthers short, dehiscing longitudinally. *Ovary* inferior, usually 3-, rarely 2- or 4-, celled; ovules 2–4 in each cell, pendulous from the inner angle; style filiform; stigma capitate or slightly lobed. *Fruit* a cylindric or subglobose drupe, crowned by the calyx-lobes; stone usually woody, 1–3-seeded. *Seeds* oblong, testa thin, albumen fleshy; embryo straight or curved, the cotyledons very short.

Symlocos, Linn.

CHARACTERS OF THE FAMILY.

Filaments more or less pentadelphous; corolla-tube divided nearly to the base:—

Stamens few, about 12, in pairs or 3–4 together or solitary, as long as the corolla; flowers in very short 3–6-flowered pubescent racemes; leaves elliptic, shortly acute at apex, cuneate at base, subcoriaceous, entire or crenate-serrate, up to about 4 in. long, 1.25 in. broad, shortly petioled.....1. *oligandra*.

Stamens many, usually about 40, in several rows in a ring or in bundles at the base of the corolla:—

Drupe ampulliform, globose, ribbed, .25 in. in diam., embryo curved; flowers in axillary usually 3-branched spikes up to about 3 in. long; leaves variable, coriaceous or chartaceous, elliptic or lanceolate, acute or acuminate, crenate

or serrate, usually yellow when dry, the midrib impressed, up to 7 in. long, 2.5 broad.....2. *spicata*.

Drupe ovoid-oblong, not ampulliform; embryo straight:—

Midrib of leaf impressed on the upper surface:—

Inflorescence paniculate, the branches racemose; leaves elliptic, caudate-acuminate, rounded at base, minutely serrulate, glabrous, about 5-nerved, up to 3.5 in. long, 1.5 in. broad.....3. *Candolleana*.

Inflorescence simple:—

Inflorescence 4—many-flowered:—

Drupe large, about 1 in. long or longer, smooth:—

Endocarp of drupe thick, crustaceous, stone with many shallow furrows; leaves lanceolate or oblanceolate, long acuminate, closely serrate, yellowish when dry, up to 8 in. long, 2.5 in. broad, the main nerves regular, about 10 pairs; branchlets and racemes rusty-pubescent.....4. *macrocarpa*.

Endocarp of drupe leathery, stone deeply 5—6 furrowed; leaves elliptic-ovate, or -obovate, long acuminate, crenate-serrate, up to 5 in. long, 2 in. broad, green when dry, the main nerves 5—8 pairs; branchlets glabrous.....5. *kanarana*.

Drupe small, under 1 in. long, cylindric ovoid or oblong:—

Drupe villous, .5 in. long; branchlets, leaves beneath and inflorescence densely rusty-villous; leaves coriaceous, elliptic, acuminate, crenulate, the margins recurved when old, up to 6 in. long, 3 in. broad, yellow when dry, the main nerves prominent, about 10—12 pairs.....6. *Gardneriana*.

Drupe glabrous:—

Leaves submembranous, bright green:—

Leaves cuneate at base:—

Racemes up to 2 in. long with very slender hispid rhachis and pedicels; flowers large, calyx-lobes rounded; leaves lanceolate, long-acuminate, up to 4 in. long, 1.5 in. broad, shortly and distantly serrate.....7. *acuminata*.

Racemes scarcely over 1 in. long with rather stout villous rhachis and short pedicels; flowers small, calyx-lobes acute; leaves lanceolate or oblanceolate, long- and sometimes abruptly-acuminate, up to 8 in. long, 2 in. broad, shortly but sharply serrate but sometimes nearly entire; drupe ovoid-oblong, .5 in. long.....8. *rosea*.

Leaves rounded or cordate at base, oblong-oblanceolate, acute or acuminate at apex, up to 5 in. long, 1.5 in. broad, nearly quite entire; racemes very short and dense, prominently bracteate; calyx-lobes ovate, tawny villous; drupe oblong, .6 in. long, contracted near the tip, the fruiting calyx lobes prominent.....9. *Barberi*.

Leaves coriaceous:—

All parts quite glabrous; leaves obovate, obtuse, somewhat decurrent at base, entire or serrate when young, up to 3 in. long, 1.75 in. broad, main nerves about 6 pairs; spikes about 1.5 in. long with large flowers, the bracts ovate, caducous; drupe oblong, .5 in. long.....10. *obtusata*.

Inflorescence fulvous-villous:—

Branchlets when young and leaf-midribs beneath hispid; leaves elliptic or oblong, acuminate, prominently serrate, up to 5 in. long, 1.5 in. broad but longer and broader when young; main nerves 8—12 pairs, reticulation conspicuous; spikes 1—1.5 in. long with large flowers, the bracts caducous; drupe cylindric, .5 in. long.....11. *foliosa*.

Branchlets and leaves glabrous; leaves elliptic, acute or acuminate, crenate-serrate, shining above, the margin often recurved, up to 6 in. long, 2.5 in. broad, main nerves 6—10 pairs; spikes 2—5 in. long, the bracts ovate, caducous; drupe ovoid, .4—5 in. long.....12. *Beddomei*.

Inflorescence few- under 4-flowered:—

Leaves coriaceous, small:—

Flowers 1—4 in close pubescent spikes about .5 in. long; leaves elliptic, ovate or obovate, obtuse or slightly acute, minutely serrulate, the margin recurved, yellow when dry, up to 2.5 in. long, 1 in. broad, main nerves 5—6 pairs, prominent; drupe ovoid-oblong, .5 in. long, the calyx teeth prominent.....13. *microphylla*.

Flowers solitary:—

Flower on a slender recurved peduncle up to .5 in. long; leaves elliptic, obtuse or acute, serrulate, glabrous, up to 1.75 in. long, 1 in. broad, the main nerves 4—6 pairs, not prominent; drupe narrow, oblong, .5—75 in. long.....14. *anamallayana*.

Flower sessile or very shortly peduncled; leaves elliptic or lanceolate, acute or acuminate, entire or minutely toothed, up to 1.75 in. long, .75 in. broad, main nerves not prominent.....15. *monantha*.

Leaves membranous, fairly large:—

Leaves oblong-lanceolate, long-acuminate, rounded or subcordate at base, brown hirsute on both surfaces and on the branchlets, sharply serrate, up to 6 in. long, 2 in. broad, main nerves oblique, 7—8 pairs; flowers large, about 3—4 in slender racemes.....16. *pulchra*.

Leaves lanceolate, long-acuminate, cuneate at base, pale brown-hirsute on the nerves and the branchlets, minutely serrate, up to 5 in. long, 1.5 in. broad, main nerves not oblique, 7—9 pairs; flowers solitary, small, subsessile, many-bracteate; drupe oblong, villous, up to .5 in. long.....17. *villosa*.

Midrib of leaf raised on the upper surface, leaves elliptic, long-acuminate, cuneate at base, glabrous, shining, coriaceous, up to 5 in. long, 2 in. broad; branchlets angular; racemes .5 in. long, few-flowered; drupe ovoid, glabrous, .4 in. long, the calyx-lobes short.....18. *theaeifolia*.

Filaments adnate to the corolla-tube; corolla-tube elongate; flowers solitary:—

Flower peduncled, the peduncles 1—3 together, axillary or lateral, pendulous; calyx-lobes rounded, ciliate; corolla .5 in. long, lobes spreading in flower; leaves elliptic-obovate, obtuse, coriaceous, glabrous, up to 4 in. long, 2 in. broad; drupe oblong, .6 in. long, glabrous.....19. *pendula*.

Flower sessile or subsessile, erect, axillary; calyx-lobes very short, rounded, ciliate; corolla .5 in. long, lobes suberect; leaves obovate, obtuse, coriaceous, glabrous, cuneate at base, up to 2 in. long, .5—75 in. broad; drupe oblong-obovoid, .6 in. long, glabrous.....20. *sessilis*.

1. SYMPLOCOS OLIGANDRA, Bedd. Ic. t. 272; F. B. I. iii. 574.

W. Gháts, hills of Travancore and Tinnevely, at 3,000—5,000 ft. (Beddome).

A small or medium-sized tree, characterised by the few stamens.

2. SYMPLOCOS SPICATA, Roxb.; F. B. I. iii. 573, Var. *laurina*; Wt. Ill. t. 150.

E. Gháts, Hills of Vizagapatam, about 4,000 ft. (A. W. Lushington); Carnatic, Shevaroy Hills and Kollimalai Hills of Trichinopoly; W. Gháts in all Districts, in evergreen Shola forests, above 3,000 ft.

A small tree with white flowers. Bark thin, smooth, light grey; wood white, soft, even-grained, only used for fuel. Vern. *Hind.* Lodh; *Tam.* Kambli vetti; *Badaga* Boothgani.

3. SYMPLOCOS CANDOLLEANA, Brand Monog. 49.

W. Gháts, Anamalai Hills at 2,500 ft. (Beddome).

A very large tree (Beddome), but very little known.

4. SYMPLOCOS MACROCARPA, Wight; F. B. I. iii. 582.

W. Gháts, evergreen forests of Travancore and Tinnevely, at 2,000—3,000 ft.

- A much-branched, moderate-sized tree with white flowers and large white drupe. Bark smooth; wood white, soft. Vern. *Tam.* Paralei; *Mal.* Malam parala.
5. *SYMPLOCOS KANARANA*, Talb. in Journ. Bomb. Nat. Hist. Soc. xi. 238, t. 9.
W. Gháts, Anamalais and hills of Travancore and Tinnevelly, in evergreen forests up to 2,000 ft.
A moderate-sized tree with yellow drupe, the flowers not known.
6. *SYMPLOCOS GARDNERIANA*, Wt. Ic. t. 1231; F. B. I. iii. 582.
W. Gháts, Bababudan Hills of Mysore, at 6,000 ft. (Talbot), Nilgiris, Anamalais and hills of Tinnevelly and Travancore above 3,000 ft. in evergreen Shola forests.
A tree with white flowers and purple (Bourdillon) fruit.
Var. *Hohenackeri*, Gamble. *S. Hohenackeri*, C. B. Clarke; F. B. I. iii. 582. *S. Kurgensis*, C. B. Clarke; F. B. I. iii. 576 Calyx-tube glabrous.
W. Gháts, Mercara in Coorg (Hohenacker).
7. *SYMPLOCOS ACUMINATA*, Bedd. Ic. t. 117; F. B. I. iii. 583. *S. tenella*, Brand Monog. 54.
W. Gháts, from Wynaad to Travancore and Tinnevelly, at about 5,000 ft.
A graceful little tree with white flowers.
8. *SYMPLOCOS ROSEA*, Bedd.; F. B. I. iii. 583; Bedd. Ic. t. 115.
W. Gháts, Anamalais and hills of Tinnevelly, at 2,000—4,000 ft., in evergreen forests.
A small tree or large shrub with tawny-villous branchlets, pink flowers and reddish drupe.
Var. *glabrior*, C. B. Clarke. Leaves rather thicker, more shining, less serrate, abruptly acuminate at apex; calyx-tube glabrous.
W. Gháts, Wynaad and hills of Travancore at 1,000—3,000 ft., a shrub.
9. *SYMPLOCOS BARBERI*, Gamble in Kew Bull. 1921, 219.
W. Gháts, hills of Tinnevelly (Beddome, Barber).
A small tree.
10. *SYMPLOCOS OBTUSA*, Wall.; F. B. I. iii. 583; Wt. Ic. t. 1233, Ill. t. 151 b.
W. Gháts, Sholas of Nilgiris and Pulneys above 6,000 ft., most common at high elevations like Doddabetta.
A glabrous tree with white flowers and shining leaves yellowish when dry.
11. *SYMPLOCOS FOLIOSA*, Wt. Ic. t. 1234; F. B. I. iii. 582. *S. nervosa*, Wt. Ic. t. 1235 not of A. DC
W. Gháts, Sholas of Nilgiris and Pulneys above 5,000 ft., common; hills of Travancore (Bourdillon).
A moderate-sized or large tree with characteristic reticulate serrate leaves and white flowers. Wood white, soft and even grained, only used for fuel. Pulney specimens have longer and more acuminate leaves but do not differ otherwise. Young plants and shoots have the branchlets and leaves strigosely hairy and the serratures more marked. Vern. *Tam.* Pal velloday.

12. *SYMPLOCOS BEDDOMEI*, C. B. Clarke ; F. B. I. iii. 582.
W. Gháts, S. Canara, Malabar, Mysore and Coorg, at 2,000—4,000 ft.
A moderate-sized tree with white fragrant flowers and dark blue drupe turning yellow when dry.
13. *SYMPLOCOS MICROPHYLLA*, Wt. Ic. t. 1232 ; F. B. I. iii. 581.
W. Gháts, Nilgiris about Avalanché and Sispara above 7,000 ft., in Shola woods.
A branching glabrous shrub about 6 ft. high.
14. *SYMPLOCOS ANAMALLAYANA*, Bedd. Ic. t. 116 ; F. B. I. iii. 581.
W. Gháts, Anamalai Hills above 5,000 ft., in Shola woods (Beddome, Fischer).
A small tree.
15. *SYMPLOCOS MONANTHA*, Wt. Ic. t. 1236 ; F. B. I. iii. 581.
W. Gháts, Sivagiri and other hills of Tinnevely.
A branching leafy shrub.
16. *SYMPLOCOS PULCHRA*, Wt. Ic. t. 1230, Spic. Neilgh. t. 143 ; F. B. I. iii. 583.
W. Gháts, Sispara in Nilgiris, at 4,000—5,000 ft., on stream banks.
A diffuse shrub with large white flowers and long tawny hairs to the leaves and branchlets.
17. *SYMPLOCOS VILLOSA*, Brand Monog. 63.
W. Gháts, evergreen forests about Peermerd in Travancore at 3,000—4,000 ft.
A small much-branched tree with small white flowers.
18. *SYMPLOCOS THEAEFOLIA*, D. Don Prodr. Fl. Nep. 145 ; F. B. I. iii. 575.
N. Circars, Madgol Hills of Vizagapatam at Rangalu and Gomangi, 3,000—4,000 ft. (A. W. Lushington).
A small glabrous tree with bright shining leaves and very short inflorescence.
19. *SYMPLOCOS PENDULA*, Wt. Ic. t. 1237 ; F. B. I. iii. 587.
W. Gháts, Anamalais, Pulneys and hills of Travancore, at 4,000—7,000 ft., in evergreen forests.
A small or moderate-sized tree with pink flowers, the drupes black when ripe.
20. *SYMPLOCOS SESSILIS*, C. B. Clarke ; F. B. I. iii. 587.
W. Gháts, hills of Travancore and Tinnevely at 4,000—5,000 ft., in evergreen forests.
A small or moderate-sized tree with white or pinkish flowers and black drupe.

Family XCVII. OLEACEAE.

Trees or erect or climbing shrubs, unarmed. *Leaves* opposite, very rarely alternate, simple 3-foliate or pinnate, entire or toothed ; stipules 0. *Flowers* hermaphrodite, often dimorphous, sometimes polygamous or dioecious, regular, usually in trichotomous terminal or axillary cymes or panicles, rarely fascicled or racemose. *Calyx* small, free, campanulate, truncate or lobed. *Corolla* usually gamopetalous, lobes 4—9 or 0, imbric-

cate or induplicate valvate; tube long or short. *Stamens* 2 (in Indian species), inserted on the corolla-tube, or, if petals free or 0, hypogynous; filaments usually short, anthers dehiscing laterally or subextrorsely. *Ovary* free, 2-celled; ovules 1—2 in each cell attached to the inner angle near the apex or base; style short or long; stigma simple or 2-lobed. *Fruit* a loculicidal capsule, or indehiscent, or a succulent berry or drupe. *Seeds* solitary or 2 in each cell, erect or pendulous; testa usually thin; albumen fleshy horny or 0; embryo straight; radicle inferior or superior.

Corolla-lobes imbricate:—

Seeds erect, radicle inferior:—

Shrubs, usually climbing; fruit of 2 berry-like carpels, one sometimes wanting

1. *Jasminum*

Erect shrub or small tree; fruit a compressed bipartite capsule...2. *Nyctanthes*

Seeds pendulous, winged, radicle superior; tree with a woody pyriform loculicidally dehiscent capsule.....3. *Schrebera*

Corolla-lobes valvate:—

Erect trees or shrubs, leaves penninerved, radicle superior:—

Flowers in axillary panicles:—

Corolla of distinct petals, free or connate in pairs.....4. *Linociera*.

Corolla tubular or 0.....5. *Olea*.

Flowers in terminal panicles; corolla funnel-shaped.....6. *Ligustrum*.

Scandent shrubs, leaves with prominent ribs; radicle inferior...7. *Myxopyrum*.

1. *Jasminum*, Linn.

Erect or climbing shrubs. *Leaves* opposite, rarely alternate, simple trifoliate or imparipinnate. *Flowers* usually handsome, often sweet-scented, in terminal or axillary cymes, rarely solitary; bracts linear and small or ovate, sometimes petaloid; bracteoles usually linear. *Calyx*-tube funnel-shaped or campanulate; lobes 4—9, usually linear. *Corolla*-tube narrow, more or less elongate; lobes 4—10, spreading, imbricate in bud. *Stamens* 2, usually included in the corolla-tube; anthers oblong, connective usually produced. *Ovary* 2-celled; ovules 2 in each cell, attached near the base; style filiform, long or short; stigma usually bifid. *Fruit* a didymous berry or simple by the suppression of one carpel; carpels globose ellipsoid or elongate. *Seed* in each carpel 1, rarely 2, erect; testa thin; albumen 0; cotyledons plano-convex; radicle inferior.

Leaves simple:—

Calyx pubescent:—

Calyx-lobes linear subulate:—

Calyx-lobes .25 in. long or longer:—

Erect or somewhat climbing; calyx-lobes curled, especially in fruit; leaves variable, usually ovate, obtuse acute or even acuminate, membranous; carpels globose, black.....1. *Sambac*.

Climbing shrubs:—

Bracts ovate, green, often absent; calyx-lobes .3—5 in. long; corolla-lobes about 8, elliptic-oblong, acute; leaves ovate, acute, cordate at base, pubescent or tomentose, up to 2.5 in. long, 1.5 in. broad...2. *pubescens*.
Bracts lanceolate, white; calyx-lobes .2—3 in. long; corolla lobes 5—7, oblong, obtuse; leaves elliptic-lanceolate, acuminate, rounded or cordate at base, villous or subglabrous, up to 4 in. long, 1.5—2 in. broad

3. *Rottlerianum*.

Bracts subulate, filiform; calyx-lobes .25 in. long; corolla lobes about 6, narrowly oblong, acute or acuminate; leaves broadly ovate, abruptly,

cate or induplicate valvate; tube long or short. *Stamens* 2 (in Indian species), inserted on the corolla-tube, or, if petals free or 0, hypogynous; filaments usually short, anthers debiscing laterally or subextrorsely. *Ovary* free, 2-celled; ovules 1—2 in each cell attached to the inner angle near the apex or base; style short or long; stigma simple or 2-lobed. *Fruit* a loculicidal capsule, or indehiscent, or a succulent berry or drupe. *Seeds* solitary or 2 in each cell, erect or pendulous; testa usually thin; albumen fleshy horny or 0; embryo straight; radicle inferior or superior.

Corolla-lobes imbricate:—

Seeds erect, radicle inferior:—

Shrubs, usually climbing; fruit of 2 berry-like carpels, one sometimes wanting

1. *Jasminum*

Erect shrub or small tree; fruit a compressed bipartite capsule...2. *Nyctanthes*

Seeds pendulous, winged, radicle superior; tree with a woody pyriform loculicidally dehiscent capsule.....3. *Schrebera*.

Corolla-lobes valvate:—

Erect trees or shrubs, leaves penninerved, radicle superior:—

Flowers in axillary panicles:—

Corolla of distinct petals, free or connate in pairs.....4. *Linociera*.

Corolla tubular or 0.....5. *Olea*.

Flowers in terminal panicles; corolla funnel-shaped.....6. *Ligustrum*.

Scandent shrubs, leaves with prominent ribs; radicle inferior...7. *Myxopyrum*.

1. *Jasminum*, Linn.

Erect or climbing shrubs. *Leaves* opposite, rarely alternate, simple trifoliate or imparipinnate. *Flowers* usually handsome, often sweet-scented, in terminal or axillary cymes, rarely solitary; bracts linear and small or ovate, sometimes petaloid; bracteoles usually linear. *Calyx*-tube funnel-shaped or campanulate; lobes 4—9, usually linear. *Corolla*-tube narrow, more or less elongate; lobes 4—10, spreading, imbricate in bud. *Stamens* 2, usually included in the corolla-tube; anthers oblong, connective usually produced. *Ovary* 2-celled; ovules 2 in each cell, attached near the base; style filiform, long or short; stigma usually bifid. *Fruit* a didymous berry or simple by the suppression of one carpel; carpels globose ellipsoid or elongate. *Seed* in each carpel 1, rarely 2, erect; testa thin; albumen 0; cotyledons plano-convex; radicle inferior.

Leaves simple:—

Calyx pubescent:—

Calyx-lobes linear subulate:—

Calyx-lobes .25 in. long or longer:—

Erect or somewhat climbing; calyx-lobes curled, especially in fruit; leaves variable, usually ovate, obtuse acute or even acuminate, membranous; carpels globose, black.....1. *Samhac*.

Climbing shrubs:—

Bracts ovate, green, often absent; calyx-lobes .3—5 in. long; corolla-lobes about 8, elliptic-oblong, acute; leaves ovate, acute, cordate at base, pubescent or tomentose, up to 2.5 in. long, 1.5 in. broad...2. *pubescens*. Bracts lanceolate, white; calyx-lobes .2—3 in. long; corolla lobes 5—7, oblong, obtuse; leaves elliptic-lanceolate, acuminate, rounded or cordate at base, villous or subglabrous, up to 4 in. long, 1.5—2 in. broad

3. *Rottlerianum*.

Bracts subulate, filiform; calyx-lobes .25 in. long; corolla lobes about 6, narrowly oblong, acute or acuminate; leaves broadly ovate, abruptly,

Leaves with all three leaflets similar and present, the lateral lobes little smaller than the terminal; calyx-lobes minute:—

Leaves opposite, glabrous, leaflets elliptic or ovate, acute to caudate-acuminate at apex, rounded or obtuse or truncate at base, the terminal one up to 5 in. long, 2 in. broad; cymes lax, elongate, paniculate; corolla-tube .7—1 in. long, lobes .5 in., elliptic; anthers apiculate.....17. *flexile*.
Leaves opposite or alternate, glabrous, leaflets broadly ovate or deltoid, obtuse or very shortly acute at apex, rounded or truncate at base, the terminal up to 2 in. long, 1.5 in. broad; cymes trichotomous, the end branches corymbose; corolla-tube .75 in. long, .3 in. broad, oblong; anthers acute

18. *calophyllum*.

Leaves imparipinnate:—

Leaves opposite; corolla white, reddish beneath, lobes spreading, flowers in terminal corymbose panicles; calyx-lobes long and linear.....19. *grandiflorum*.
Leaves alternate; corolla yellow, lobes recurved, flowers in short few-flowered cymes opposite the leaves; calyx-lobes very short.....20. *bignoniaceum*.

1. *JASMINUM SAMBAC*, Ait.; F. B. I. iii. 591; Wt. Ic. t. 704.

All Districts, doubtfully really wild but common near villages as an escape from cultivation. Arabian Jasmine.

An erect or sometimes climbing small shrub with pubescent branchlets and fragrant white flowers. Cultivated plants have often double flowers, largely used for garlands. Vern. *Hind*. Mogra; *Tam*. Kodi mulli.

Var. *Heyneanum*, C. B. Clarke, a twining form with small ovate acuminate leaves and shorter calyx-lobes. W. Gháts, Pulney Hills, etc.

2. *JASMINUM PUBESCENS*, Willd.; F. B. I. iii. 592. *J. hirsutum*, Willd.; Wt. Ic. t. 702. *J. bracteatum*, Roxb.; Wt. Ic. t. 1248.

W. Gháts, in most Districts, up to 5,000 ft., but scarce, often cultivated.

A climbing shrub with white flowers in dense capitate cymes and globose black carpels. Vern. *Hind*. Kundá.

3. *JASMINUM ROTTLEIANUM*, Wall.; F. B. I. iii. 593; Wt. Ic. t. 1249.

W. Gháts, in all Districts, up to 5,000 ft.

A large extensively climbing shrub, usually very tawny villous but sometimes nearly glabrous. Flowers and bracts white, the cymes close and terminal, the carpels ellipsoid, black.

4. *JASMINUM MALABARICUM*, Wt. Ic. t. 1250; F. B. I. iii. 594.

W. Coast and W. Gháts in S. Canara, Mysore, Malabar and W. Nilgiris up to about 4,000 ft.

A large climbing shrub with white fragrant flowers in loose trichotomous terminal cymes, the carpels ellipsoid.

Var. *Lawii*, C. B. Clarke. Leaves gradually acuminate, calyx-lobes shorter and corolla-lobes narrower. Taliparamba in Malabar (Barber).

5. *JASMINUM ARBORESCENS*, Roxb.; F. B. I. iii. 594; Wt. Ic. t. 699. *J. latifolium*, Roxb.; Wt. Ic. t. 703.

N. Circars, hills of Ganjam and Vizagapatam, up to 3,000 ft.

A large suberect or climbing shrub with white fragrant flowers and black ellipsoid usually solitary carpels. The leaves are sometimes grey-tomentose on both surfaces.

6. *JASMINUM SCANDENS*, Vahl; F. B. I. iii. 595.

N. Circars, hills of Ganjam and Vizagapatam, up to 4,500 ft. (Barber, A. W. Lushington).

- A climbing shrub with white flowers said to be sometimes tinged with pink, the carpels ellipsoid, usually solitary.
7. JASMINUM ROXBURGHIANUM, Wall.; F. B. I. iii. 595.
Deccan, Ramandrug Hills in Bellary, at 2,000 ft., Bababudan hills of Mysore (Law).
A villous climbing shrub, the carpels usually solitary, black, ellipsoid.
 8. JASMINUM CORDIFOLIUM, Wall.; F. B. I. iii. 596. *J. erectiflorum*, A. D.C.; Wt. Ic. t. 1251.
W. Gháts, Coimbatore and Nilgiris, up to 5,000 ft., hills of Tinnevely.
A large climbing shrub with spirally twisted stems, white flowers and ellipsoid carpels.
 9. JASMINUM SESSILIFLORUM, Vahl; F. B. I. iii. 597.
Carnatic, from Chingleput and S. Arcot to the E. slopes of the W. Gháts, southwards to the Tinnevely Hills.
A branching climber with small leaves, white flowers and globose carpels.
 10. JASMINUM RIGIDUM, Zenk. Pl. Ind. Coimb. t. 6; F. B. I. iii. 598; Wt. Ic. t. 1247.
Deccan and Carnatic, in plains and hills, up to 5,000 ft., westwards to the E. slopes of the W. Gháts, common.
A rigid shrub with shining leaves, white flowers and black subglobose carpels. Vern. Tel. Uti, Pedda malli.
 11. JASMINUM RITCHIEI, C. B. Clarke; F. B. I. iii. 598.
W. Gháts, hills of Mysore, Nilgiris, Wynaad, in evergreen forests at low levels; Shevaroy Hills.
A branched climbing shrub with slender white flowers and globose carpels.
 12. JASMINUM ANGUSTIFOLIUM, Vahl; F. B. I. iii. 598; Wt. Ic. t. 698.
Circars, Deccan and Carnatic, on eastern side, down to S. Travancore.
A wiry climbing shrub with white flowers and ellipsoid carpels.
 13. JASMINUM WIGHTII, C. B. Clarke; F. B. I. iii. 598.
Bolampatti Valley of Coimbatore (Wight).
A wiry climber with very flexuous branches.
 14. JASMINUM TRICHOTOMUM, Heyne, F. B. I. iii. 599.
W. Deccan, Coimbatore Hills, up to 2,000 ft.; Carnatic, in Tanjore; Paulghatcheri (Cleghorn).
A rather stiff climbing shrub.
 15. JASMINUM AURICULATUM, Vahl; F. B. I. iii. 600; Wt. Ic. t. 700. *J. affine*, Wt. Ic. t. 1255. *J. ovalifolium*, Wt. Ic. t. 1296.
Circars, Deccan and Carnatic, in all Districts, south to S. Travancore, westwards to the dry slopes of the W. Gháts, sometimes cultivated.
A climbing shrub with white flowers and globose black carpels.
 16. JASMINUM BREVILOBUM, A. DC.; F. B. I. iii. 600.
W. Gháts, Nilgiris and Pulneys above 3,000 ft., in Shola forest.
A large climbing shrub with spirally twisted stems up to 1 ft.

in diameter and a curious wood-structure. Flowers white, carpels black, globose.

17. *JASMINUM FLEXILE*, Vahl; F. B. I. iii. 601; Wt. Ic. t. 1253.

W. Coast and W. Gháts, in all Districts, up to 5,000 ft.

A climbing shrub with white fragrant flowers and ellipsoid carpels.

Var. *travancoreense*, Gamble. *J. travancoreense*, Klein, in Wall. Cat. 2881, the terminal leaflet shining, not truncate at base, elliptic-oblong, the nerves, about 8 pairs, more prominent and prominently arched, the apex caudate.

W. Coast, S. Canara to Travancore at low elevations.

18. *JASMINUM CALOPHYLLUM*, Wall.; F. B. I. iii. 602. *J. courtallense*, Wt. Ic. t. 1252.

W. Gháts, Nilgiris, Anamalais and hills of Tinnevely, up to 4,000 ft.

A slender climber with white flowers and subglobose carpels.

19. *JASMINUM GRANDIFLORUM*, Linn.; F. B. I. iii. 603; Wt. Ic. t. 1257.

N. Circars, Mahendragiri in Ganjam (Fischer), hills of Vizagapatam (A. W. Lushington); W. Gháts, Nilgiris, Pulneys and hills of Tinnevely above 5,000 ft., probably introduced and run wild, often cultivated.

A climbing shrub with fragrant flowers. Vern. *Hind.* Chambel.

20. *JASMINUM BIGNONIACEUM*, Wall.; Fyson Hillt. Fl. 276, *J. humile*, Linn.; F. B. I. iii. 602 in part. *J. revolutum*, Sims, var. *peninsulare*, A. DC.; Wt. Ic. t. 1258.

W. Gháts, Nilgiris, Pulneys and hills of Malabar and Travancore, above 5,000 ft.

An erect shrub with angular branchlets, small leaflets, few rather large bright yellow flowers and black globose carpels.

2. *Nyctanthes*, Linn.

Shrubs or small trees. *Leaves* opposite, ovate, entire or toothed. *Flowers* in small sessile bracteate heads disposed in terminal trichotomous cymes. *Calyx* ovoid-cylindric, sub-truncate, finally splitting or deciduous. *Corolla* salver-shaped; tube cylindric, orange; lobes 4—8, contorted in bud, spreading, white. *Stamens* 2, subsessile near the top of the corolla-tube. *Ovary* 2-celled; ovule 1 in each cell, erect, basal; style cylindric; stigma shortly bifid. *Fruit* an orbicular capsule, compressed parallel to the septum, separating when ripe into 2 1-seeded cells. *Seed* erect, flattened, testa thin; albumen 0; cotyledons flat; radicle inferior.

NYCTANTHES ARBOR-TRISTIS, Linn.; F. B. I. iii. 603; Bedd. Fl. t. 240.

N. Circars, in deciduous forests down to the Godavari, elsewhere doubtfully wild but commonly cultivated.

A bushy shrub or small tree rough with stiff hairs. The yellow corolla-tubes give an orange dye and the flowers, which come out in the evening and fall off in the morning, are used in garlands, while the rough leaves may be used for polishing wood. Bark rough, light brown; wood pale red or yellowish-brown,

close-grained. Vern. *Hind.* Harsinghar; *Ur.* Godokodika; *Tel.* Poghada; *Tam.* Manjhapu.

3. Schrebera, Roxb.

Trees. *Leaves* opposite, imparipinnate, leaflets opposite. *Flowers* in terminal 2—3-chotomous compound cymes; bracts small. *Calyx* campanulate, truncate or unequally 4—7-toothed. *Corolla* salver-shaped; tube cylindric; lobes 4—7, imbricate in bud, then spreading. *Stamens* 2, near the top of the corolla-tube; filaments short. *Ovary* 2-celled; ovules 3—4 in each cell, pendulous from its apex; style cylindric; stigma shortly bifid. *Fruit* a woody obovoid, loculicidally 2-valved capsule. *Seeds* pendulous; testa winked; albumen 0; cotyledons fleshy, flattened, with wavy longitudinal plaits; radicle superior.

SCHREBERA SWIETENIODES, Roxb.; Cor. Pl. t. 101; F. B. I. iii. 604; Wt. III. t. 162; Bedd. Fl. t. 248.

N. Circars and Deccan, in deciduous forest, especially in Ganjam, Godavari and Kurnool; Forest of Mudumalai in S. E. Wynaad. A moderate-sized tree reaching about 50 ft. in height, the flower yellowish-brown covered with brown glands, the capsule about 2 in. long, the leaflets 7—9, glabrous or villous beneath. Bark grey, thick; wood brownish-grey, hard and close-grained, resembling boxwood in texture. Vern. *Hind.* Moka; *Ur.* Jantia, Nemiburo; *Tel.* Makkam; *Tam.* Mogalinga.

4. Linociera, Swartz.

Shrubs or trees. *Leaves* opposite, entire. *Flowers* in axillary or lateral rarely terminal panicles or cymes; bracts small. *Calyx* small, 4-lobed. *Corolla* of 4 long or short petals, nearly free or connate in pairs, induplicate-valvate in bud. *Stamens* 2; filaments short, attached at the base of the petals; anthers dehiscing on the margin, connective broad. *Ovary* 2-celled; ovules 2 in each cell, pendulous from its apex; style short; stigma bifid or entire. *Fruit* a globose ellipsoid or oblong drupe; exocarp thin, endocarp bony or crustaceous. *Seed* usually solitary, pendulous; testa thin; albumen fleshy or 0, if fleshy the cotyledons flattened, radicle superior.

Seeds albuminous; flowers in clusters in few-branched cymes, the corolla-lobes .25 in. long; drupe ellipsoid:—

Calyx-lobes ovate, grey-pubescent; leaves elliptic or elliptic-oblong, obtuse or with a short abrupt acumen, cuneate at base, up to 5 in. long, 2 in. broad, main nerves about 10 pairs joining in loops; ovary pubescent.....1. *malabarica*.

Calyx-lobes rounded, nearly glabrous but ciliate; leaves elliptic, caudate-acuminate at apex, somewhat rounded at base, up to 4 in. long, 1.75 in. broad, main nerves about 8 pairs joining in loops at about .1 in. from the margin; ovary glabrous2. *Wightii*.

Seeds exalbuminous; flowers in panicles, the corolla-lobes less than .25 in. long:—

Panicles short, 1—1.25 in. long; calyx-lobes small, ciliate; corolla-lobes .15 in. long; leaves obovate, obtusely acute or emarginate, cuneate at base, margins recurved, up to 3 in. long, 1.5 in. broad; ovary glabrous.....3. *zeylanica*.

Panicles more than 1.25 in. long:—

Drupe ellipsoid, .3—6 in. long; panicles up to 5 in. long; corolla-lobes .1—1.5 in. long; leaves elliptic or elliptic-oblong or lanceolate, acuminate at both ends, shining, up to 7 in. long, 2.5 in. broad, more in young plants or shoots, main nerves prominent, regular, about 10—12 pairs, .3—5 in. apart on the midrib4. *intermedia*.

Drupe oblong, .6—8 in. long; panicles about 3—4 in. long; corolla-lobes .1 in. long; leaves oblong or elliptic-oblong or slightly oblanceolate, shortly acute at apex, acuminate at base, rather dull, up to 8 in. long, 2.5 in. broad, main nerves about 8 pairs, .6—1 in. apart on the midrib.....5. *macrophylla*.

Seeds not known; flowers in short axillary racemes or clusters, about .5 in. long, glabrous; leaves elliptic-oblong, thick, drying red-brown, shortly abruptly acuminate at apex, up to 7.5 in. long, 2.5 in. broad, the main nerves about 10 distant pairs, prominent and prominently joining in loops.....6. *courtallensis*.

1. *LINOCIERA MALABARICA*, Wall.; F. B. I. iii. 607; Wt. Ic. t. 1246. *Chionanthus malabarica*, Bedd. Fl. t. 239, fig. in corner.
N. Circars, Palkonda hills of Vizagapatam, at 2,000 ft. (Gamble); Carnatic, Melpat and Javadis in S. Arcot (Barber, Fischer); W. Gháts, in all Districts, in evergreen forests up to 4,000 ft.
A small or moderate-sized tree with white or yellowish-white flowers.
2. *LINOCIERA WIGHTII*, C. B. Clarke; F. B. I. iii. 608. *Olea linocieroides*, Wt. Ic. t. 1241.
W. Gháts, hills of Travancore and Tinnevelly, in evergreen forest, at low levels.
A small tree with white flowers.
3. *LINOCIERA ZEYLANICA*, Gamble n. comb. *L. purpurea*, Vahl; F. B. I. iii. 608.
Deccan and Carnatic, Ballipalle forests of Cuddapah at 1,000 ft., Nellore forests, Kambakam hills of Chingleput; W. Gháts, hills of S. Tinnevelly and Travancore at 1,000—2,000 ft.
A small tree with red (?) flowers. Wood white or yellowish-white, hard and close-grained like boxwood. Vern. Tel. Punisi, Panagam.
4. *LINOCIERA INTERMEDIA*, Wt. Ic. t. 1245; F. B. I. iii. 609. *Chionanthus intermedia*, Bedd. Fl. t. 239 (leaves bad).
N. Circars, hill forest, up to 4,500 ft. on Mahendragiri, etc., south to the Godavari, west to Jeypore; Carnatic, Shevaroy Hills, Kollimalai hills of Trichinopoly; W. Gháts, from Mysore and Coimbatore southwards, up to 5,000 ft., on E. side.
A large tree with white flowers. Bark light yellowish-brown; wood white, moderately hard, close-grained.
5. *LINOCIERA MACROPHYLLA*, Wall.; F. B. I. iii. 610.
N. Circars, Ganjam to Godavari, in forest, especially about Surada at 1,500 ft.; Pulney Hills (Bourne)?; hills of Travancore at 4,000 ft. in moist forest (Bourdillon).
A tree with white flowers and oblong drupes, the leaves distinct by the distant nerves. The Travancore specimens have smaller leaves than those from the north, but seem otherwise to belong to the same species.
6. *LINOCIERA COURTALLENSIS*, Bourd. Trav. Trees 260. *L. leprocarpa*, Thw. var. *courtallensis*, C. B. Clarke; F. B. I. iii. 609. *Chionanthus courtallensis*, Bedd.
W. Gháts, about Courtallum in Tinnevelly; Peermerd and Cardamom Hills of Travancore at 3,000—5,000 ft. in evergreen forests.
A medium-sized tree with white flowers and a brownish-purple ovoid drupe 1 in. long (Bourdillon).

5. *Olea*, Linn.

Shrubs or trees. *Leaves* opposite, entire or toothed. *Flowers* small, hermaphrodite dioecious or polygamous, in axillary or lateral rarely terminal panicles; bracts small. *Calyx* small, 4-lobed. *Corolla* rotate or campanulate; lobes 4, valvate, often induplicate. *Stamens* 2, on the corolla-tube or subhypogynous; filaments short, connective broad, anthers dehiscing marginally. *Ovary* 2-celled; ovules 2 in each cell; style short; stigma capitate or bifid. *Fruit* an ellipsoid or subglobose drupe; exocarp fleshy, endocarp bony or crustaceous. *Seed* usually solitary, pendulous; testa thin; albumen fleshy; cotyledons flat; radicle superior.

Flowers hermaphrodite; corolla deeply lobed, the lobes spreading, flattened; leaves rhomboid lanceolate elliptic or ovate, acuminate, usually very abruptly, at apex, cuneate at base, glandular in the nerve-axils, chartaceous, up to 4 in. long, 2 in. broad1. *glandulifera*.
Flowers polygamo-dioecious; corolla campanulate, the lobes short, their margins induplicate-valvate; leaves coriaceous:—

Leaves variable in shape, usually elliptic-lanceolate, entire or serrate, acute or acuminate, acute at base, up to 5 in. long, 2 in. broad, the main nerves 8—12 pairs.....2. *dioica*.
Leaves broadly elliptic, suddenly shortly acuminate, entire, drying reddish-brown, the margins recurved, up to 3.5 in. long, 1.5 in. broad.....3. *polygama*.

1. *OLEA GLANDULIFERA*, Wall.; F. B. I. iii. 612; Wt. Ic. t. 1238; Bedd. Fl. t. 238. *O. Bournei*, Fyson in Kew Bull. 1914, 186.

N. Circars, hills of Ganjam and Vizagapatam, up to 4,500 ft. on Mahendragiri; Deccan, Bababudan Hills of Mysore at 5,000 ft.; W. Gháts in almost all districts, in Shola forests above 4,000 ft.

A moderate-sized tree with white flowers and an ovoid drupe. The South Indian trees (*O. Bournei*) have more rounded leaves with fewer main nerves than those of N. India, but otherwise seem to be the same. Bark grey; wood reddish-grey, hard. Vern. *Badaga*. Kunthay.

2. *OLEA DIOICA*, Roxb.; F. B. I. iii. 612; Wt. Ill. t. 151.

W. Gháts, all Districts, up to about 5,000 ft., both in deciduous and evergreen forest.

A moderate-sized or large tree with creamy white flowers, variable leaves and an ovoid blue drupe. Bark brown, rough; wood pale brown, hard. Vern. *Tam.* Koli, Payar, Yedalei; *mal.* Edana.

3. *OLEA POLYGAMA*, Wt. Ic. tt. 1239, 1240; F. B. I. iii. 613.

W. Gháts, between Avalanché and Sispara, Nilgiris, about 7,000 ft., in Shola forest.

A small tree with many pretty white flowers, the drupe unknown.

6. *Ligustrum*, Linn.

Shrubs or trees; branchlets often lenticellate. *Leaves* opposite, entire. *Flowers* white, in terminal often thyrsoid panicles, the lower nodes often bracteate. *Calyx* small, truncate or shortly 4-toothed. *Corolla* funnel-shaped, the tube short or long; lobes 4, induplicate-valvate. *Stamens* 2, on the corolla-tube; anthers oblong or rounded,

included or exserted. Ovary 2-celled, ovules 2 in each cell, pendulous; style rather long; stigma subclavate. Fruit a 1–3-seeded drupe, endocarp chartaceous or thin. Seeds pendulous; testa thin; albumen fleshy; radicle short, superior.

Panicles loose, puberulous, up to 12 in. long with rather short slender distant bracteate branches; leaves elliptic or lanceolate, long and sharply acuminate, up to 4 in. long, 2 in. broad; drupes obovoid, up to .25 in. long; flowers small, corolla-tube about as long as the calyx1. *Walkerii*.
Panicles large, pubescent, often 8 in. long and broad with stout thick branches; leaves ovate-lanceolate, acuminate, up to 5 in. long, 2 in. broad; drupe oblong, often curved, up to .5 in. long; flowers rather small, corolla-tube as long as the calyx2. *Roxburghii*.
Panicles short, broad, depressed above, up to 2.5 in. long, 4 in. broad, glabrous; leaves lanceolate, acuminate at both ends, long-petioled, up to 3 in. long, 1 in. broad; drupe ellipsoid, .4 in. long; flowers small, corolla-tube as long as the calyx3. *travancoricum*.
Panicles stout, short, dense, glabrous or nearly so, scarcely 3 in. long; leaves ovate or elliptic, acute, up to 2 in. long, .75 in. broad; drupe ellipsoid, .25 in. long; flowers rather large, corolla-tube twice as long as the calyx4. *Perrottetii*.
Panicles lax, short, glabrous, scarcely 1.5–2 in. long; leaves elliptic-lanceolate, acute or acuminate, up to 2.5 in. long, .75 in. broad; drupe ellipsoid, .25 in. long; flowers very small, corolla-tube scarcely as long as the calyx5. *Decaisnei*.

1. *LIGUSTRUM WALKERI*, Dcne; F. B. I. iii. 614.
W. Gháts in most Districts, up to 5,000 ft.; Shevaroy Hills and Kollimalai Hills (?).
A small tree with large bracteate panicles, large leaves and lenticellate branchlets.
2. *LIGUSTRUM ROXBURGHII*, C. B. Clarke; F. B. I. iii. 615. *Olea robusta*, Wt. Ic. t. 1242.
W. Gháts, Nilgiris, Pulneys and hills of Coimbatore, at 4,000–6,000 ft. in Shola forest, especially about Coonoor and on other E. slopes.
A small or medium-sized tree with broad panicles, rather large leaves and lenticellate branchlets. Wood white, close-grained.
3. *LIGUSTRUM TRAVANCORICUM*, Gamble in Kew Bull., 1922, 119.
W. Gháts, hills of Travancore and Tinnevely, at about 4,500 ft. (Bourdillon).
A small tree with depressed panicles and long-acuminate, long-petioled coriaceous leaves.
4. *LIGUSTRUM PERROTTETII*, A. DC.; F. B. I. iii. 615; Wt. Ic. t. 1244. *L. neilgherrense*, Wt. Ic. t. 1243; F. B. I. iii. 615.
W. Gháts, Nilgiri Hills, on the banks of streams at 6,000–7,000 ft., common, Pulneys, Anamalais and hills of Tinnevely, more scarce.
A large shrub resembling the European Privet (*L. vulgare*, Linn.) but with larger flowers.
Var. *obovatum*, Gamble. *L. neilgherrense*, Wt. var. *obovata*, C. B. Clarke; F. B. I. iii. 615. Leaves obovate, obtuse, panicles larger.
Bababudan hills of Mysore (Law).
5. *LIGUSTRUM DECAISNEI*, C. B. Clarke; F. B. I. iii. 616.
W. Gháts, hills of Coimbatore, Nilgiris, hills of Madura and Tinnevely, on Eastern slopes usually, up to 5,000 ft.
A shrub with rough branchlets, small leaves and flowers.

Var. *microphylla*, C. B. Clarke. *L. microphyllum*, Wt.; leaves lanceolate, narrow, acuminate; panicles rather longer.

W. Gháts, Sivagiri and Courtallum Hills of Tinnevely.

Var. *Beddomei*, Gamble. *L. microphyllum*, Bedd. Fl. Sylv. div; leaves very small, under 1 in. long, ovate, acute; panicles slender, with distant branches.

Coorg, about Kiggatnad (Beddome).

Ligustrum lucidum, Ait., is a Chinese species frequently found in gardens in the Hills.

7. *Myxopyrum*, Blume.

Large scandent shrubs; branches 4-angular. *Leaves* opposite, triplicate, entire or serrulate. *Flowers* small, yellowish, in axillary or terminal trichotomous panicles; bracts minute or 0. *Calyx*-tube short; lobes 4. *Corolla*-tube urceolate; lobes 4, induplicate-valvate in bud. *Stamens* 2, on the base of the corolla-tube; filaments short; anthers ovate. *Ovary* 2-celled, ovules 1—2 in each cell; style very short; stigma 2-lobed. *Fruit* a 1—2-seeded subglobose berry; pericarp crustaceous. *Seeds* erect, testa membranous; albumen thick; cotyledons flat, ovate; radicle inferior.

MYXOPYRUM SERRATULUM, A. W. Hill in Kew Bull. 1910, 41. *M. smilacifolium*, Bl.; F. B. I. iii. 618 in part.

W. Gháts, Wynaad, Anamalai Hills and hills of Travancore, in evergreen forests, at 2,000—3,000 ft.

A large climbing shrub with serrulate lanceolate acuminate leaves which have prominent side ribs forming a looped nerve to which the few main nerves are joined.

Family XCVIII. SALVADORACEAE.

Shrubs or trees, unarmed or spiny. *Leaves* opposite, entire; stipules minute or 0. *Flowers* small, hermaphrodite or diœcious, in paniced spikes or racemes. *Calyx* free, campanulate or ovoid, 3—5-lobed. *Corolla* shortly campanulate or the petals free; lobes 4, imbricate in blood. *Stamens* 4, on the corolla-tube or hypogynous, alternate with the corolla-lobes; anthers ovate. *Ovary* superior, 1—2-celled; ovules 1—2 in each cell; style short; stigma 2-fid or subentire. *Fruit* a berry or drupe, usually 1-seeded. *Seed* erect, globose; albumen 0; cotyledons fleshy, plano-convex.

Erect unarmed trees or shrubs; corolla gamopetalous; stamens on the corolla-tube; ovary 1-celled, 1-ovuled.....1. *Salvadora*.
Rambling shrubs with axillary spines; corolla of free petals; stamens free; ovary 2-, or falsely 4-celled, ovules 1—2.....2. *Azima*.

1. *Salvadora*, Linn.

Shrubs or trees. *Leaves* opposite, entire. *Flowers* small, sessile or pedicelled, in paniced spikes or racemes; bracts minute. *Calyx* campanulate, 4-lobed. *Corolla* campanulate, tube short, lobes 4. *Stamens* 4, inserted at the base or middle of the corolla-tube. *Disk* of 4 small

scales or glands or 0. *Ovary* 1-celled; ovule solitary; style very short or 0; stigma truncate. *Drupe* globose, supported by the persistent calyx and corolla; endocarp crustaceous. *Seed* erect, globose.

SALVADORA PERSICA, Linn.; F. B. I. iii. 619; Roxb. Cor. Pl. t. 26. *S. indica*, Wt. Ill. t. 181. *S. Wightiana*, Bedd. Fl. t. 247.

Circars, Deccan and Carnatic, in open places, especially on saline lands and often on black cotton soil. Tooth-brush tree.

A large evergreen shrub or small tree with short trunk, very small flowers and fruit and rather small ovate-oblong obtuse petioled greyish-green leaves. Bark thin, grey; wood white, soft. The twigs are used as tooth-cleaners. Vern. *Hind.* Jhal; *Tel.* Waragu-wenki; *Tam.* Opa.

2. *Azima*, Lamk.

Rambling shrubs with axillary spines. *Leaves* opposite, entire. *Flowers* dioecious, small, axillary, sessile or clustered on the branches of a slightly branched panicle; bracts 0 or foliaceous; bracteoles linear. *Calyx* campanulate, in ♂ 4-fid, in ♀ irregularly 2—4-lobed. *Corolla* of 4 free narrow imbricate petals. *Stamens* 4; filaments slender. *Ovary* 2-celled; ovules 1 or 2 in each cell, erect; stigma subsessile, large. *Fruit* a globose usually 1-seeded berry; endocarp membranous. *Seeds* 1—2, globose.

AZIMA TETRACANTHA, Lamk.; F. B. I. iii. 620; Wt. Ill. t. 152.

Circars, Deccan and Carnatic, especially near the coast, in hedges and thickets.

A straggling shrub with pale almost quadrangular branchlets, greyish-green shining leaves with 2—3 pairs of prominent nerves from the base, mucronate tips and straight spines from the axils. The white berries are eaten. Vern. *Tel.* Tella upi; *Tam.* Ichanka.

Family XCIX. APOCYNACEAE.

Trees or erect or climbing shrubs, rarely herbs. *Leaves* opposite or whorled, rarely alternate, entire; stipules 0. *Flowers* regular, hermaphrodite, in terminal or axillary cymes, often large and showy; bracts small. *Calyx* inferior; lobes 5, imbricate, often with glands within at the base. *Corolla* usually salver-shaped or funnel-shaped; lobes 5, rarely 4, contorted and often twisted in bud, overlapping to right or left. *Stamens* 5, rarely 4, alternate with the corolla-lobes, inserted in the corolla-tube or on its mouth; filaments usually short; anthers linear-oblong or sagittate, free or connivent in a cone and adherent to the stigma by the connective, anther cells dehiscing longitudinally, sometimes produced at the base in empty spurs. *Disk* 0 or annular or cupular or reduced to 2—5 scales or glands. *Ovary* 1-celled with 2 parietal placentas or 2-celled with axile placentas, or of 2 distinct or partially connate carpels; ovules 2 or few or many, rarely solitary; style simple or divided at the base; stigma usually ending in an entire or bifid apiculus. *Fruit* a dry or fleshy drupe berry or samara, or of 2 baccate or follicular mericarps. *Seeds* various, often compressed,

sometimes winged, sometimes with a tuft of hairs (*coma*) at one or both ends; albumen hard, fleshy, or scanty or 0; embryo straight; cotyledons flat, concave convolute or contracted; radicle superior.

Anthers included, free from the stigma, the cells rounded at the base:—

Ovary of 2 wholly combined carpels, 1—2-celled; seeds without wing or coma:—

Ovary 1-celled; fruit 2-valved:—

Flowers small; fruit a fleshy berry.....1. *Chilocarpus*.

Flowers large and showy; fruit a spinescent capsule.....*Allamanda*.

Ovary 2-celled; erect or climbing spinose shrubs.....2. *Carissa*.

Ovary of 2 distinct carpels, usually united by the style but sometimes at the base or throughout:—

Leaves alternate; corolla large and showy, the lobes overlapping to left:—

Corolla funnel-shaped; fruit indehiscent:—

Calyx glandular within; flowers yellow; leaves linear.....*Thevetia*.

Calyx not glandular within; flowers white; leaves oblanceolate, fleshy.....3. *Cerbera*.

Corolla salver-shaped; fruit of 2 dehiscent follicles; calyx not glandular within; flowers yellowish-white or red.....*Plumeria*.

Leaves opposite or whorled; corolla salver-shaped:—

Calyx not glandular within; fruit of 2 1- or many-seeded drupes or follicles:—

Fruit indehiscent, drupaceous; seeds few, without wings or coma:—

Corolla-lobes overlapping to the left:—

Leaves usually whorled; erect shrubs; fruit mericarps more or less united, sessile.....4. *Rauwolfia*.

Leaves opposite; trees; fruit mericarps stalked.....5. *Hunteria*.

Corolla-lobes overlapping to the right; trees or shrubs with opposite leaves; fruit mericarps 1—2-seeded, free.....*Kopsia*.

Fruit dehiscent, of 2 slender many-seeded follicles, corolla-lobes overlapping to the left:—

Herbaceous plants with opposite leaves; seeds truncate at both ends.....6. *Lochnera*.

Trees or shrubs with whorled leaves; seeds ciliate at both ends.....7. *Alstonia*.

Calyx glandular within, fruit of 2 follicular mericarps:—

Follicles many-seeded, linear:—

Corolla-lobes overlapping to the left; seeds winged at both ends; climbing shrubs.....8. *Ellerstonia*.

Corolla-lobes overlapping to the right; seeds with a deciduous silky coma at the top; trees.....9. *Holarrhena*.

Follicles few-seeded, baccate, stout and coriaceous; seeds arillate, without coma; erect trees or shrubs:—

Corolla-tube dilated at the base, lobes overlapping to the left; leaves with conspicuous horizontal impressed main nerves.....10. *Rejoua*.

Corolla-tube slightly dilated near the top, lobes overlapping to the left or right; leaves with slender oblique main nerves.....11. *Ervatamia*.

Anthers included or exerted, conniving in a cone round and adherent to the stigma, the cells produced at base in an empty spur; fruit of 2 follicular mericarps with comose seeds:—

Anthers exerted:—

Climbing shrubs; coma of the seeds terminal:—

Filaments of the stamens long, spirally twisted.....12. *Parsonsia*.

Filaments of the stamens short, not spirally twisted.....13. *Vallaris*.

Erect trees or shrubs; coma of the seeds basal; corolla with a corona of scales.....14. *Wrightia*.

Anthers included:—

Mouth of corolla with a ring of scales:—

Erect shrubs with whorled leaves and pink flowers; corolla lobes not tailed.....*Nerium*.

Spreading or climbing shrubs with opposite leaves; corolla-lobes tailed.....15. *Strophanthus*.

Mouth of corolla naked; leaves opposite; climbing shrubs:—

Corolla very large, white; leaves very large:—

Corolla campanulate or funnel-shaped.....16. *Beaumontia*.

Corolla salver-shaped, lobes sharply twisted to the left...17. *Chonemorpha*.

Corolla medium-sized, tube bearded within behind the anthers; calyx divided

nearly to the base.....18. *Aganosma*.

Corolla small, the lobes overlapping to the right:—

Follicles stout, large, the seeds long-beaked.....19. *Anodendron*.

Follicles very slender, narrow; tips of corolla-lobes deflected
20. *Ichnocarpus*.

1. *Chilocarpus*, Blume.

Climbing shrubs. *Leaves* opposite, petioled, the main nerves horizontal, close and usually joining in an intramarginal nerve. *Flowers* small, in axillary cymes. *Calyx* short, eglandular; lobes 5. *Corolla* hypocrateriform, contracted at the throat; lobes 5, short, overlapping to the left, twisted to the right. *Stamens* inserted on the tube, included; anthers lanceolate, acute. *Disk* 0. *Ovary* 1-celled with 2 parietal placentas; ovules many, 2-seriate; style short; stigma ovoid or conical. *Fruit* a fleshy berry, at length 2-valved, pericarp thick. *Seeds* embedded in pulp with fibrous and corky arils; albumen copious, equable or ruminate; cotyledons flat; radicle elongate.

CHILOCARPUS ATRO-VIRIDIS, Bl.; F. B. I. iii. 626. *C. malabaricus*, Bedd. Ic. t. 175.

W. Ghâts in S. Canara, Malabar and Travancore, in evergreen forests up to 2,000 ft.

A large climber with milky juice and small whitish flowers and oblong abruptly acuminate shining leaves up to 5 in. long, 2 in. broad, the main nerves very many and parallel. The fruit is not known.

2. *Cariaca*, Linn.

Much-branched spinous shrubs, erect or climbing. *Leaves* opposite, coriaceous, the spine-bearing pairs usually larger than the intermediate ones. *Flowers* in terminal and axillary pedunculate trichotomous cymes. *Calyx* 5-lobed, the lobes acute or acuminate. *Corolla* hypocrateriform; tube cylindric, dilated at top opposite the stamens, more or less pubescent within; lobes 5, usually overlapping to the right, about half the length of the tube. *Stamens* 5, on the corolla-tube, included; anthers lanceolate. *Ovary* 2-celled; ovules 1—4 in each cell, rarely more; style filiform; stigma fusiform or columnar, minutely 2-fid. *Fruit* an ellipsoid ovoid or globose berry, 2- or, by abortion, 1-celled. *Seeds* usually 2 or 4, peltately attached to the septum; albumen fleshy; cotyledons ovate; radicle inferior.

Corollas large, the tube over .6, usually over .75 in. long; berry 4-seeded:—

Spines straight, often 1.5 in. long, often forked at tip; leaves elliptic-oblong, obtuse or emarginate at apex, rounded or even subcordate at base, up to 3 in. long, 1.5 in. broad; cymes puberulous, the peduncles .25—1 in. long; berry .5—1 in. long, ellipsoid.....1. *Carandas*.

Spines curved, often 2 in. long, not forked; leaves ovate or elliptic-ovate or lanceolate, acute or acuminate at apex, rounded or acute at base, up to 3.5 in. long, 2 in. broad; cymes puberulous or nearly glabrous, sessile; berry .75—1 in. long, ellipsoid.....2. *inermis*.

Corollas medium-sized, the tube 4—6 or —7 in. long; berry 4-seeded:—

Spines straight or very slightly curved; leaves broadly ovate or suborbicular, obtuse at apex, slightly cuneate at base, up to 2.5 in. long, 1.5 in. broad, the nerves about 5 pairs not prominent; cymes shortly peduncled, the corolla-lobes ciliate; berry globose, nearly .5 in. diam.....3. *congesta*.
Spines straight, stout, usually forked; leaves ovate or suborbicular, obtusely slightly acute and mucronate at apex, sometimes emarginate, rounded or slightly acute at base, up to 1.5 in. long, 1 in. broad, nerves about 6 pairs, prominent, the basal 2nd arched to meet the rest; cymes shortly peduncled; calyx-lobes long acuminate; berry ovoid.....4. *spinarum*.

Corollas small, the tube less than 4 in. long; cymes shortly peduncled:—

Seeds 4; spines long and straight, up to 1.5 in. long, sometimes forked; brachlets and leaves softly grey-tomentose, the leaves elliptic oblong, obtuse or acute at apex, slightly cuneate at base, up to 2 in. long, 1 in. broad, the nerves about 8 pairs, the lowest pair oblique and arched to meet the rest; calyx-lobes ovate, villous; berry globose, .2 in. in diam.....5. *hirsuta*.
Seeds 2; spines straight; leaves glabrous:—

Leaves ovate-rhomboid, acute or obtuse and mucronate at apex, cuneate at base, up to 2 in. long, 1.3 in. broad, the nerves about 4 pairs, indistinct; calyx-lobes acuminate, pubescent; berry ovoid, .25 in. in diam.....6. *gangetica*.
Leaves narrowly elliptic- or oblong-lanceolate, acute at apex, cuneate at base, up to 2 in. long, .5—7 in. broad, the nerves about 6 pairs, not prominent, the lowest 1—2 pairs oblique; calyx-lobes ovate, acute, ciliate; berry ovoid, .25 in. in diam.....7. *salicina*.
Leaves elliptic-ovate or lanceolate, acute at both ends, mucronate, up to 1.5 in. long, .5 in. broad, the nerves 2—3 pairs, oblique and indistinct; calyx-lobes small, lanceolate, ciliate; berry ellipsoid, .3 in. in diam.....8. *paucinervia*.

1. *CARISSA CARANDAS*, Linn.; F. B. I. iii. 630; Roxb. Cor. Pl. t. 77; Wt. Ic. t. 426.

N. Circars, Deccan and Carnatic, in dry forests; often cultivated.
A large thorny shrub or small tree with white or pale rose-coloured flowers and red berry turning purple or black on ripening and good to eat, especially in tarts and preserves.
Bark yellowish-brown; wood white with an irregular grey-or orange-yellow streaked heartwood, used to make combs and spoons and as fuel. The thorny branches are used for fencing.
Vern. *Hind.* Karaunda; *Ur.* Kerendo kuli; *Tel.* Kalivi; *Tam.* Kalaaha, Kila.

2. *CARISSA INERMIS*, Vahl. *C. macrophylla*, Wall; F. B. I. iii. 631; *C. suavissima*, Bedd.; F. B. I. iii. 632.

N. Circars, hills of Vizagapatam (Barber); W. Ghâts, in almost all Districts, in evergreen forests, up to 6,000 ft.
A large climbing shrub with white flowers and edible purple fruit, sometimes, perhaps, found as a bush. Bark brown, rough, peeling off in small flakes; wood white, soft.

3. *CARISSA CONGESTA*, Wt. Ic. t. 1289. *C. Carandas*, Linn. var. *congesta*, Bedd.; F. B. I. iii. 631.

W. Ghâts, Mysore, Coorg and S. Canara.

An erect shrub with rather thin leaves and white flowers.

4. *CARISSA SPINARUM*, Linn. Mant. 559; F. B. I. iii. 631. *C. diffusa*, Roxb.; Wt. Ic. t. 427.

N. Circars and Carnatic, down to S. Travancore, in dry scrub forests, less common inland.

A large thorny shrub with zigzag branches. Wood like that of *C. Carandas*. Vern. *Hind.* Karaunda; *Tam.* Chiru kila.

Var. *microphylla*, Gamble. Smaller with smaller leaves, often scarcely .5—75 in. long and prominently nerved and smaller flowers, the corolla-tube sometimes less than .4 in.

Carnatic, from Madras southwards to S. Travancore, near the coast.

5. *CARISSA HIRSUTA*, Roth. *C. spinarum* var. *hirsuta*, Hook. f.; F. B. I. iii. 631. *C. villosa*, Roxb.; Wt. Ic. t. 437.

Deccan and Carnatic, in dry hilly country, up to 3,000 ft.: Nellore (Ramaswami), Anantapur (Gamble), Walliar, Ayamalai Hills (Wight), Coimbatore (Fischer).

A thorny shrub with white flowers and black-purple berry, the grey-tomentose branchlets and leaves very characteristic, but sometimes nearly glabrous.

6. *CARISSA GANGETICA*, Stapf in Herb. Kew.

N. Circars, Mahendragiri Hill in Ganjam at 4,500 ft. (Gamble, Fischer and Gage).

A thorny shrub.

7. *CARISSA SALICINA*, Lamk. Encycl. i. 554.

Deccan, Hassanur in Coimbatore (Herb. Madras).

A thorny shrub with narrow leaves, the spines simple. Perhaps only a rather larger-leaved form of the next.

8. *CARISSA PAUCINERVIA*, A. DC.; F. B. I. iii. 631; Wt. Ic. t. 1290.

Deccan, hills of Mysore, Salem and Coimbatore; W. Gháts, Nilgiri Hills at 4,000—6,000 ft. on E. side, common.

A diffuse bushy shrub with many sharp spines, white or slightly rose-coloured flowers and small dark purple edible berries.

3. *Cerbera*, Linn.

Small glabrous trees. *Leaves* alternate or scattered, long, main nerves slender, horizontal and parallel. *Flowers* large, white or red, in pseudoterminal cymes. *Calyx* 5-lobed, eglandular, lobes long. *Corolla* large, tube cylindric below, funnel-shaped above the throat with 5 villous scales; lobes 5, spreading, over-lapping to the left. *Stamens* small, included; anthers lanceolate, apiculate, the cells rounded at base. *Disk* 0. *Ovary* of 2 distinct carpels; ovules 4 in each carpel, on both sides of a thick placenta. *Fruit* of 1, rarely 2, globose or ellipsoid drupes; pericarp very thick, fibrous and woody. *Seeds* broad, compressed, peltately attached to the enlarged placenta; albumen none; cotyledons thin; radicle very short.

CERBERA MANGHAS, Linn. *C. Odollam*, Gaertn.; F. B. I. iii. 638; Wt. Ic. t. 441.

E. and W. Coast, in salt swamps and backwaters.

A moderate-sized or small tree with lanceolate or oblanceolate bright green fleshy leaves, large white flowers and large green fruit with fibrous pericarp. Wood grey, very soft and spongy.

Vern. *Tam.* Kada má, Kat arali; *Mal.* Othalam.

4. *Rauwolfia*, Linn.

Shrubs, glabrous or rarely pubescent. *Leaves* 3- to 4-nately whorled, rarely opposite, the main nerves slender and usually arched. *Flowers*

in corymbose or umbellate cymes, the peduncles alternate with the terminal leaves or axillary. *Calyx* 5-lobed, eglandular. *Corolla*-tube cylindric, dilated opposite the stamens, the mouth constricted, the throat usually hairy within; lobes usually 5, overlapping to the left. *Stamens* 5, included, on the corolla-tube; filaments very short; anthers small, acute, the cells rounded at base. *Disk* cup-shaped or annular. *Ovary* of 2 distinct or connate carpels; ovules 2 in each carpel, collateral; style filiform; stigma calyptriform at the base, the tip bifid. *Fruit* of 2 connate or distinct drupes, each with a crustaceous 1-seeded pyrene. *Seeds* ovoid; testa thin; albumen fleshy; cotyledons flat; radicle superior.

Corolla-tube long and slender, about .5 in., narrow, dilated a little above the middle, lobes .15 in. long; calyx-lobes short; cymes closely corymbose on single peduncles 2—5 in. long; drupes slightly connate, obliquely ovoid, .25 in. long, pyrenes slightly rugose; leaves in whorls of 3, thin, lanceolate, acute or acuminate, the main nerves rather distant, oblique.....1. *serpentina*.

Corolla-tube about .25 in. long, broad, dilated at the top, lobes long, rounded; calyx-lobes long and slender; cymes rather lax, on peduncles about 1—2 in. long, several together; drupes distinct, ellipsoid, about .5 in. long, pyrenes very rugose; leaves oblanceolate, in whorls of 3—4, pale beneath, the main nerves many, sub-horizontal, regular.....2. *densiflora*.

Corolla-tube short and narrow, slender, dilated at top, lobes short; calyx-lobes very short:—

Cymes lax, few-flowered, on peduncles about 1.5 in. long, usually 2 together; drupes joined to the middle, ovate, acute, .2 in. long, pyrenes rugose; leaves elliptic-lanceolate or -oblanceolate, long-acuminate, usually in whorls of 3, the main nerves very slender, about 12 pairs.....3. *micrantha*.

Cymes very lax, few-flowered, on single slender peduncles about 4 in. long, the divaricate branches also long and slender; drupes joined to the middle, ovate, acute, .3 in. long, pyrenes scarcely rugose; leaves oblanceolate, acuminate, very thin, in whorls of 3 of unequal size, the main nerves many, close and regular.....4. *Beddomei*.

Corolla-tube short, about .1 in. long, broad, lobes very short, rounded; calyx-lobes short, round, ciliate; drupes joined to the top, ovoid, .2 in. long, pyrenes rugose; leaves in whorls of about 4, very unequal in size, elliptic, acute.....*canescens*.

1. *RAUWOLFIA SERPENTINA*, Benth. ex Kurz; F. B. I. iii. 632. *Ophioxylon serpentinum*, Linn.; Wt. Ic. t. 849.

W. Ghâts, in all Districts, in moist forest undergrowth, at low levels and up to 3,000 ft.

A herbaceous undershrub with red pedicels and calyx, white corolla and purplish-black fruit. The root is used in medicine. Vern. *Hind.* Choto chand; *Tel.* Patalgani; *Tam.* Chivan amelpodi.

2. *RAUWOLFIA DENSIFLORA*, Benth. ex Hook. f.; F. B. I. iii. 633. *Ophioxylon ceylanicum*, Wt. Ic. t. 1291. *O. neilgherrense*, Wt. Ic. t. 1292.

E. Ghâts, Rumpu Hills of Godavari, 4,000 ft. (Gamble); W. Ghâts, Nilgiris, Pulneys, Anamalais and hills of Tinnevely and Travancore, at 4,000—7,000 ft.

A rather large shrub, sometimes reaching 12 ft. in height with white or pink flowers and brownish-purple fruit.

3. *RAUWOLFIA MICRANTHA*, Hook. f.; F. B. I. iii. 633.

W. Ghâts, Malabar (Wight) and Travancore (Rama Rao) near Kottayam.

A slender shrub, apparently very scarce.

4. *RAUWOLFIA BEDDOMEI*, Hook. f.; F. B. I. iii. 634. *Tabernaemontana verticillata*, Bedd. Fl. Sylv. clix.

W. Ghâts, hills of Tinnevely and Travancore (Beddome).

A large dichotomously branched glabrous shrub with very slender inflorescence and pointed carpels.

R. canescens, Linn., is a small W. Indian shrub found in gardens and sometimes run wild in the neighbourhood of Madras. The fruits are red.

5. *Hunteria*, Roxb.

Glabrous trees. *Leaves* opposite, coriaceous, shining, with many slender main nerves. *Flowers* in short terminal axillary or subterminal cymes. *Calyx* small, 5-lobed, eglandular. *Corolla* salver-shaped, tube cylindric, slightly dilated near the top, lobes overlapping to the left. *Stamens* inserted at the dilation of the tube; anthers lanceolate, the cells rounded at base. *Disk* 0. *Ovary* of 2 carpels; ovules 2—4 to each carpel. *Fruit* of 2 stalked fleshy ovoid berries, each 1-seeded or 2-celled by the intruded placenta. *Seeds* ovoid or oblong; albumen fleshy; cotyledons ovate; radicle straight.

HUNTERIA CORYMBOSA, Roxb.; F. B. I. iii. 637; Wt. Ic. t. 428; Bedd. Fl. t. 265.

Var. *Roxburghiana*, Trim. *H. Roxburghiana*, Wt. Ic. t. 1294.

W. Ghâts, evergreen forests of Travancore and Tinnevely at 1,000—2,000 ft.

A small tree with pale yellow flowers and narrow linear lanceolate shining leaves with many nearly parallel main nerves meeting in an intramarginal nerve and up to 6 in. long, .75 in. broad. Bark light brown, thin; wood brownish yellow, hard and close-grained.

6. *Lochnera*, Reichb.

Annual or perennial herbs or undershrubs. *Leaves* opposite, axillary glands numerous. *Flowers* axillary, solitary or in pairs, white or pink. *Calyx* 5-lobed, eglandular; lobes subulate. *Corolla* salver-shaped; tube slender, cylindric, inflated over the stamens below the constricted mouth; lobes overlapping to the left. *Stamens* on the corolla-tube; anthers lanceolate, acute. *Disk* of 2 linear glands. *Ovary* of 2 free carpels; ovules numerous, 2-seriate; style filiform; stigma depressed-capitate with a reflexed hyaline frill at base, the apiculus 2-lobed. *Fruit* of 2 half divaricate slender cylindric follicles. *Seeds* numerous, small; testa muriculate; albumen fleshy; cotyledons flat, shorter than the thick radicle.

LOCHNERA PUSILLA, K. Schum. *Vinca pusilla*, Murr.; F. B. I. iii. 640. Plains Districts of the Circars, Deccan and Carnatic, up to 2,000 ft., a common weed, more scarce on W. Coast.

A branching glabrous annual with small white flowers, follicles about 2 in. long and lanceolate membranous leaves, the seeds oblong, black and muriculate in lines. Said to be poisonous to cattle (Lawson).

L. rosea, Reichb., is a common garden shrub with rose-coloured or white flowers and obovate shining leaves. It probably came from the W. Indies and is sometimes found run wild.

7. *Alstonia*, R. Br.

Trees or shrubs, branches often in whorls. *Leaves* generally whorled, rarely opposite, often with numerous nearly horizontal parallel main nerves. *Flowers* in subterminal corymbose cymes. *Calyx*-tube short; lobes 5, eglandular. *Corolla* salver-shaped; tube cylindric, dilated opposite the stamens; lobes overlapping either to the right or left. *Stamens* usually near the top of the tube, included; anthers acute. *Disk* annular or lobed or 0, if lobed the lobes 2 alternate with the carpels. *Ovary* of 2 distinct carpels; ovules many in each carpel, many-seriate; style filiform; stigma oblong or cylindric, bifid at apex. *Fruit* of 2 linear slender follicular mericarps. *Seeds* linear or oblong, flattened, peltately attached, furnished with tufts of long brown hairs at each end; testa thin, often papillose; albumen scanty; cotyledons oblong, flat; radicle superior.

A large tree, branches whorled; leaves 4—7 in a whorl, coriaceous, elliptic-oblong or obovate or oblanceolate, obtuse at apex, pale beneath; flowers in umbellate cymes, the corolla-tube short, follicles 1—2 ft. long; seeds papillose.....1. *scholaris*.
A shrub, branches opposite or whorled; leaves 3—6 in a whorl, membranous, narrowly oblong-lanceolate, acuminate at apex, slightly pale beneath; flowers in corymbose cymes, the corolla-tube long; follicles 3—5 in. long; seeds not papillose
2. *venenata*.

1. *ALSTONIA SCHOLARIS*, R. Br.; F. B. I. iii. 642; Wt. Ic. t. 422; Bedd. Fl. t. 242.

N. Circars, not very common; Deccan, in deciduous forests; W. Gháts, in all Districts, both in deciduous and evergreen forests, up to 2,000 ft.

A large evergreen tree with greenish white flowers and long very narrow pendulous follicles. Bark dark grey, rough, lenticellate; wood white, soft, even-grained, used for boxes and temporary purposes, but not durable. Vern. *Hind.* Satiún; *Ur.* Chhatiana; *Tel.* Eda-kula; *Tam.* Mukampalei; *Mal.* Pála.

2. *ALSTONIA VENENATA*, R. Br.; F. B. I. iii. 642; Wt. Ic. t. 436.

N. Circars, hills of Ganjam and Godavari, up to 2,000 ft.; W. Gháts, hills of Coimbatore, Nilgiris, Anamalais, Pulneys and hills of Tinnevely, up to 6,000 ft.

A shrub with long white flowers and fusiform follicles stalked and beaked, the leaves long and very closely nerved. Bark thin, light brown; wood white, even-grained.

8. *Ellertonia*, Wight.

Glabrous climbing shrubs. *Leaves* opposite or 3—4-nately whorled. *Flowers* slender, in subterminal cymes. *Calyx* small, eglandular, lobes 5. *Corolla* salver-shaped; tube cylindric, slightly dilated over the stamens; throat naked, constricted; lobes 5, narrow, overlapping to the left. *Stamens* in the middle of the tube, included; anthers lanceolate, apiculate, the cells obtuse at base. *Disk* 0. *Ovary* of 2 distinct carpels;

ovules numerous in each carpel; style filiform; stigma oblong with a 2-fid apiculus. *Fruit* of 2 completely divaricate linear terete follicles. *Seeds* 2-seriate, flattened, peltately attached to the placenta, winged at both ends; testa membranous; albumen scanty; cotyledons thin, elliptic-oblong; radicle superior.

ELLERTONIA RHEEDII, Wt. Ic. t. 1295; F. B. I. iii. 641.

W. Ghâts, evergreen forests from Coorg to Travancore and Tinnevely, up to 3,000 ft.

A climber with elliptic acuminate leaves about 3 in. long, slender flowers and divaricate follicles about 5 in. long, spotted outside and with seeds acuminate winged below, rounded above, in all nearly 1 in. long, 2 in. broad in the middle.

9. *Holarrhena*, R. Br.

Trees or shrubs. *Leaves* opposite, membranous, glabrous or pubescent. *Flowers* white, in terminal or axillary corymbose cymes. *Calyx* 5-lobed, usually glandular within at the base; lobes narrow. *Corolla* salver-shaped; tube slender, cylindric, slightly dilated opposite to the stamens; lobes oblong or obovate, overlapping to the right. *Stamens* near the base of the tube, included; anthers lanceolate, mucronate, the cells rounded at the base. *Disk* none. *Ovary* of 2 distinct carpels; ovules many in each carpel; style short; stigma oblong-fusiform, the tip bifid. *Fruit* of 2 terete elongate follicular mericarps connected at the tip, then free. *Seeds* linear or oblong, concave within, tipped at the apex with a deciduous coma of long silky brown hairs; albumen scanty; cotyledons broad, complicate, radicle short, superior.

HOLARRHENA ANTIDYSENTERICA, Wall.; F. B. I. iii. 644; Brand. For. Fl. t. 40. *H. Codaga*, G. Don; Wt. Ic. t. 1297. *Chonemorpha* (?) *antidysenterica*, G. Don; Wt. Ic. t. 439.

All Forest Districts, in deciduous forests, up to 3,000 ft., common.

A small tree with white flowers, very long narrow pendulous follicles and large membranous, glabrous or pubescent, ovate to ovate-oblong or elliptic leaves. Bark thick, brown, rough; wood white, soft, even grained, used for carving and turning in N. India, rarely in the South. Vern. *Hind.* Karchi; *Ur.* Kherwa; *Tel.* Pala, Kodaga; *Tam.* Vepali; *Mal.* Kodaga pala.

10. *Rejous*, Gaudich.

Small trees, with resinous exudations at the bases of the leaves, at the bifurcations of the inflorescence and on the flower buds. *Leaves* opposite, coriaceous, main nerves strong, horizontal, impressed. *Flowers* in stout long-peduncled cymes. *Calyx* thick; lobes 5, suborbicular with many glands at the base within. *Corolla* large, salver-shaped; tube cylindric, swollen at the base; lobes oblong, falcate, overlapping to the left. *Stamens* 5, half-way down the tube; anthers lanceolate, their base rounded. *Ovary* of 2 carpels; ovules numerous; style short; stigma bifid. *Fruit* of 1—2 large recurved follicular mericarps. *Seeds* many, buried in red pulp, without coma; albumen copious; cotyledons flat.

Ervatamia.]

REJOUA DICHOTOMA, Gamble n. comb. *Tabernaemontana dichotoma*, Roxb.; F. B. I. iii. 645; Wt. Ic. t. 433.

W. Ghâts, Malabar, at low levels.

A small tree with stout woody resinous branches, oblong or obovate coriaceous leaves with about 20 main nerves at right angles to the midrib and meeting in loops, impressed above. Flowers large, white with a yellow tube; follicles 4—5 in. long, 1—2 in. broad, orange-yellow.

11. *Ervatamia*, Stapf.

Shrubs or small tree, usually glabrous. *Leaves* opposite; axillary stipules usually distinct; axillary glands small, often numerous. *Flowers* in terminal or axillary corymbose or umbelliform cymes, often in pairs; branches dichotomous. *Calyx* small; lobes 5, free or connate at the base, glandular inside. *Corolla* salver-shaped; tube cylindric, slightly dilated towards the naked mouth, opposite the stamens, villous below the dilation; lobes 5, overlapping to the left or right, much folded in bud. *Stamens* included; filaments short; anthers linear, acute or mucronate. *Disk* 0. *Ovary* of 2-carpels, distinct or slightly cohering; ovules numerous, many-seriate; style long, filiform; stigma clavate or oblong with a bifid apiculus. *Fruit* of 2 foliular mericarps, coriaceous when mature, obliquely ovoid to lanceolate, usually curved and beaked, dehiscing along the ventral suture and often opening out flat. *Seeds* few to many, enveloped in an orange or red aril, grooved ventrally; testa crustaceous, furrowed; albumen copious, waxy; cotyledons flat, cordate; radicle cylindric.

Lobes of corolla overlapping to left, in bud ovate acute; corolla-tube 5—1 in. long, dilated below the middle; leaves obovate or oblanceolate, acuminate or caudate at apex, 3—6 in. long, main nerves 6—8; follicles spreading, oblong, acuminate, 3—6-seeded.....1. *coronaria*.

Lobes of corolla overlapping to right, in bud nearly globose:—

Corolla-tube slender and narrow, 6—8 in. long, dilated at or a little above the middle; calyx-lobes unequal, oblong, ciliate; follicles ovate, long beaked, 1—(?) seeded; leaves elliptic-obovate, long and abruptly caudate acuminate at apex, up to 5 in. long, 2 in. broad, main nerves regular, about 10—12 pairs, arched

2. *caudata*.

Corolla-tube thick, 8—1 in. long, dilated at top; calyx-lobes obtuse or emarginate, thick; follicles oblong, up to 1.5 in. long, usually with short recurved beaks; seeds about 5; leaves elliptic-oblong or lanceolate, shortly acuminate at apex, up to 8 in. long, 3 in. broad, main nerves regular, prominent, 12—16 pairs, arched.....3. *Heyneana*.

1. *ERVATAMIA CORONARIA*, Stapf in Fl. Trop. Afr. iv. 127. *Tabernaemontana coronaria*, R. Br.; F. B. I. iii. 646; Wt. Ic. t. 477.

N. Circars, hills of Vizagapatam at 2,500 ft. (A. W. Lushington), the slender-flowered wild form of N. India. The form commonly cultivated in gardens has a thick corolla-tube, and is often with double flowers.

A shrub reaching 6—8 ft. in height, with white scented flowers, the crustaceous seeds with a red fleshy aril. Vern. *Hind.* Togar.

2. *ERVATAMIA CAUDATA*, Gamble in Kew Bull. 1921, 310.

W. Ghâts, Anamalai Hills (Barber, Fischer); hills of Tinnevely (Wight, Barber, Hooper and Ramaswami), at 2,500—4,000 ft., in evergreen forest.

Ervatamia.]

REJOUA DICHOTOMA, Gamble n. comb. *Tabernaemontana dichotoma*, Roxb.; F. B. I. iii. 645; Wt. Ic. t. 433.

W. Ghâts, Malabar, at low levels.

A small tree with stout woody resinous branches, oblong or obovate coriaceous leaves with about 20 main nerves at right angles to the midrib and meeting in loops, impressed above. Flowers large, white with a yellow tube; follicles 4—5 in. long, 1—2 in. broad, orange-yellow.

11. *Ervatamia*, Stapf.

Shrubs or small tree, usually glabrous. *Leaves* opposite; axillary stipules usually distinct; axillary glands small, often numerous. *Flowers* in terminal or axillary corymbose or umbelliform cymes, often in pairs; branches dichotomous. *Calyx* small; lobes 5, free or connate at the base, glandular inside. *Corolla* salver-shaped; tube cylindric, slightly dilated towards the naked mouth, opposite the stamens, villous below the dilation; lobes 5, overlapping to the left or right, much folded in bud. *Stamens* included; filaments short; anthers linear, acute or mucronate. *Disk* 0. *Ovary* of 2-carpels, distinct or slightly cohering; ovules numerous, many-seriate; style long, filiform; stigma clavate or oblong with a bifid apiculus. *Fruit* of 2 follicular mericarps, coriaceous when mature, obliquely ovoid to lanceolate, usually curved and beaked, dehiscing along the ventral suture and often opening out flat. *Seeds* few to many, enveloped in an orange or red aril, grooved ventrally; testa crustaceous, furrowed; albumen copious, waxy; cotyledons flat, cordate; radicle cylindric.

Lobes of corolla overlapping to left, in bud ovate acute; corolla-tube .5—1 in. long, dilated below the middle; leaves obovate or oblanceolate, acuminate or caudate at apex, 3—6 in. long, main nerves 6—8; follicles spreading, oblong, acuminate, 3—6-seeded.....1. *coronaria*.

Lobes of corolla overlapping to right, in bud nearly globose:—

Corolla-tube slender and narrow, .6—8 in. long, dilated at or a little above the middle; calyx-lobes unequal, oblong, ciliate; follicles ovate, long beaked, 1—(?) seeded; leaves elliptic-obovate, long and abruptly caudate acuminate at apex, up to 5 in. long, 2 in. broad, main nerves regular, about 10—12 pairs, arched

2. *caudata*.

Corolla-tube thick, .8—1 in. long, dilated at top; calyx-lobes obtuse or emarginate, thick; follicles oblong, up to 1.5 in. long, usually with short recurved beaks; seeds about 5; leaves elliptic-oblong or lanceolate, shortly acuminate at apex, up to 8 in. long, 3 in. broad, main nerves regular, prominent, 12—16 pairs, arched.....3. *Heyneana*.

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N. Circars, hills of Vizagapatam at 2,500 ft. (A. W. Lushington), the slender-flowered wild form of N. India. The form commonly cultivated in gardens has a thick corolla-tube, and is often with double flowers.

A shrub reaching 6—8 ft. in height, with white scented flowers, the crustaceous seeds with a red fleshy aril. Vern. *Hind.* Togar.

2. *ERVATAMIA CAUDATA*, Gamble in Kew Bull. 1921, 310.

W. Ghâts. Anamalai Hills (Barber, Fischer); hills of Tinnevely (Wight, Barber, Hooper and Ramaswami), at 2,500—4,000 ft., in evergreen forest.

Ervatamia.]

REJOUA DICHOTOMA, Gamble n. comb. *Tabernaemontana aschmannii*, Roxb.; F. B. I. iii. 645; Wt. Ic. t. 433.

W. Ghâts, Malabar, at low levels.

A small tree with stout woody resinous branches, oblong or obovate coriaceous leaves with about 20 main nerves at right angles to the midrib and meeting in loops, impressed above. Flowers large, white with a yellow tube; follicles 4—5 in. long, 1—2 in. broad, orange-yellow.

11. *Ervatamia*, Stapf.

Shrubs or small tree, usually glabrous. *Leaves* opposite; axillary stipules usually distinct; axillary glands small, often numerous. *Flowers* in terminal or axillary corymbose or umbelliform cymes, often in pairs; branches dichotomous. *Calyx* small; lobes 5, free or connate at the base, glandular inside. *Corolla* salver-shaped; tube cylindric, slightly dilated towards the naked mouth, opposite the stamens, villous below the dilation; lobes 5, overlapping to the left or right, much folded in bud. *Stamens* included; filaments short; anthers linear, acute or mucronate. *Disk* 0. *Ovary* of 2-carpels, distinct or slightly cohering; ovules numerous, many-seriate; style long, filiform; stigma clavate or oblong with a bifid apiculus. *Fruit* of 2 follicular mericarps, coriaceous when mature, obliquely ovoid to lanceolate, usually curved and beaked, dehiscing along the ventral suture and often opening out flat. *Seeds* few to many, enveloped in an orange or red aril, grooved ventrally; testa crustaceous, furrowed; albumen copious, waxy; cotyledons flat, cordate; radicle cylindric.

Lobes of corolla overlapping to left, in bud ovate acute; corolla-tube .5—1 in. long, dilated below the middle; leaves obovate or oblanceolate, acuminate or caudate at apex, 3—6 in. long, main nerves 6—8; follicles spreading, oblong, acuminate, 3—6-seeded.....1. *coronaria*.

Lobes of corolla overlapping to right, in bud nearly globose:—

Corolla-tube slender and narrow, .6—8 in. long, dilated at or a little above the middle; calyx-lobes unequal, oblong, ciliate; follicles ovate, long beaked, 1—(?)-seeded; leaves elliptic-obovate, long and abruptly caudate acuminate at apex, up to 5 in. long, 2 in. broad, main nerves regular, about 10—12 pairs, arched.....2. *caudata*.

Corolla-tube thick, .8—1 in. long, dilated at top; calyx-lobes obtuse or emarginate, thick; follicles oblong, up to 1.5 in. long, usually with short recurved beaks; seeds about 5; leaves elliptic-oblong or lanceolate, shortly acuminate at apex, up to 8 in. long, 3 in. broad, main nerves regular, prominent, 12—16 pairs, arched.....3. *Heyneana*.

1. *ERVATAMIA CORONARIA*, Stapf in Fl. Trop. Afr. iv. 127. *Tabernaemontana coronaria*, R. Br.; F. B. I. iii. 646; Wt. Ic. t. 477.

N. Circars, hills of Vizagapatam at 2,500 ft. (A. W. Lushington), the slender-flowered wild form of N. India. The form commonly cultivated in gardens has a thick corolla-tube, and is often with double flowers.

A shrub reaching 6—8 ft. in height, with white scented flowers, the crustaceous seeds with a red fleshy aril. Vern. *Hind. Togar*.

2. *ERVATAMIA CAUDATA*, Gamble in Kew Bull. 1921, 310.

W. Ghâts, Anamalai Hills (Barber, Fischer); hills of Tinnevely (Wight, Barber, Hooper and Ramaswami), at 2,500—4,000 ft., in evergreen forest.

A small deciduous tree with yellowish flowers, the coronal scales orange, connate follicles and ovate or obovate tomentose leaves, the white coma of the seeds at the base. Bark grey, corky; wood white, moderately hard, even-grained, useful for carving. Vern. *Hind.* Dudhi; *Ur.* Pal kurwán; *Tel.* Tella pala; *Tam.* Pala; *Mal.* Mailam pala.

15. *Strophanthus*, DC.

Small trees or shrubs, often climbing. *Leaves* opposite. *Flowers* usually large, in terminal cymes, bracts, prominent. *Calyx* 5-lobed, the tube usually glandular within. *Corolla* funnel-shaped, tube short, widening to a campanulate throat, with 10 free or connate corona scales; lobes overlapping to the right, produced in short or long often twisted tails. *Stamens* inserted at the top of the tube, included; filaments short; anthers sagittate, their tips filiform, connivent round and adnate to the stigma, the cells spurred at the base. *Disk* 0. *Ovary* of 2 distinct carpels, ovules many; style filiform, rugose; stigma columnar or conical, simple or 2-fid at apex. *Fruit* of 2 oblong or elongate spreading follicular mericarps. *Seeds* compressed, fusiform, narrowed to a feathery-plumose point, base with a deciduous tuft of hairs; albumen scanty; cotyledons plano-convex.

Lobes of the corolla long and slender, up to about 2 in. in length, much longer than the tube; calyx-lobes subulate, .3 in. long; leaves elliptic-oblong, cuspidate-acuminate, up to 3.5 in. long, 1.5 in. broad, main nerves about 6 pairs, curved from the base.....1. *Wallichii*.
Lobes of the corolla .25—.5 in. long, broad and obtuse at tip, about as long as the tube; calyx-lobes ovate, .1 in. long; leaves elliptic or elliptic obovate, acute, up to 3 in. long, 1.5 in. broad, main nerves 6—10 pairs, straight at first, curved only near the margin.....2. *Wightianus*.

1. *STROPHANTHUS WALLICHII*, A. DC.; F. B. I. iii. 655. *S. dichotomus*, Wall.; Wt. Ic. t. 59, not of DC.

N. Circars, in the mountains (*teste* Roxburgh).

A climbing shrub with ash-coloured bark with pink (Roxburgh) flowers and very long filiform anther-tails, the cymes loosely corymbose with many bracts.

2. *STROPHANTHUS WIGHTIANUS*, Wall.; F. B. I. iii. 656; Wt. Ic. t. 1301.

W. Coast, in Malabar and Travancore.

A climbing shrub with warted bark, closely corymbose cymes, anthers with rather short tails and thick woody follicles.

16. *Beaumontia*, Wall.

Large climbing shrubs. *Leaves* opposite. *Flowers* very large, white, in terminal cymes; bracts leafy. *Calyx* 5-lobed, glandular or not within; lobes foliaceous. *Corolla* funnel-shaped or campanulate, throat naked; lobes broad, overlapping to the right. *Stamens* inserted on the corolla-tube, included; filaments long, often spirally twisted; anthers horny, sagittate, conniving round and adhering to the stigma, the cells spurred at the base. *Disk* deeply 5-lobed. *Ovary* 2-celled; ovules many in each cell; style filiform; stigma oblong-fusiform. *Fruit* long, thick, woody, at length separating into 2 spreading follicular mericarps. *Seeds*

compressed, lanceolate or oblong, attenuated at apex and surmounted by a coma; testa rugose; albumen thin; cotyledons thick, foliaceous; radicle short, superior.

BEAUMONTIA JERDONIANA, Wt. Ic. tt. 1314—15; F. B. I. iii. 661.

W. Ghâts, Coorg and Wynaad.

A large climbing shrub with woody stem, large white funnel-shaped flowers and cylindric follicles 10 in. long.

B. grandiflora, Wall., a species from the E. Himalaya, is grown sometimes in gardens for its beautiful bell-shaped white flowers.

17. *Chonemorpha*, G. Don.

Stout climbing shrubs. *Leaves* opposite, large and broad. *Flowers* large, white, in lax terminal and pseudo-axillary bracteate paniculate cymes. *Calyx* tubular, with a ring of glands at the base inside; lobes 5. *Corolla* salver-shaped; tube cylindric, slightly expanded at base and throat; lobes 5, broad, overlapping to the right, sharply twisted to the left. *Stamens* inserted on the corolla-tube, included; filaments short, broad, villous; anthers sagittate, acuminate, the cells shortly incurvedly spurred below. *Disk* thick, annular or cupular. *Ovary* of 2 distinct carpels; ovules many; style filiform, cleft below; stigma conoid or sub-clavate. *Fruit* of 2 long, straight, woody, parallel, follicular mericarps. *Seeds* ovoid, produced in a beak, surmounted by a long white silky coma; testa smooth; albumen scanty; cotyledons flat, thick, oblong, radicle short, superior.

CHONEMORPHA MACROPHYLLA, G. Don; F. B. I. iii. 661; Wt. Ic. t. 432; Bot. Mag. t. 7492.

W. Ghâts, at low levels, and W. Coast, in moist forests.

A large climber with milky juice, large nearly orbicular leaves, fulvous tomentose beneath, very large fragrant white flowers, the corolla-lobes often 2 in. long and 1·5 in. broad, and follicles about a foot long.

18. *Aganosma*, G. Don.

Evergreen climbing shrubs. *Leaves* opposite. *Flowers* medium-sized or large, in terminal tomentose cymes; bracts many. *Calyx* divided nearly to the base in 5 narrow linear-lanceolate lobes, each with 2 small subulate glands at the base. *Corolla* salver-shaped; tube with lower part very short; upper part long, cylindric, with bearded longitudinal bands behind the anthers; lobes lanceolate linear-oblong or rounded, overlapping to the right. *Stamens* inserted at the base of the upper part of the corolla-tube, included; anthers sagittate, conniving over and adherent to the stigma, the cells spurred at base. *Disk* cupular, 5-lobed. *Ovary* of 2 distinct, usually hirsute, carpels; ovules many; style straight; stigma columnar. *Fruit* of 2 short or long, terete or curved, follicular mericarps. *Seeds* ovate or oblong, flattened, glabrous, with a white silky coma at tip; albumen scanty; cotyledons oblong; radicle short, superior.

Cymes laxly corymbose; calyx-lobes linear-lanceolate, about ·7 in. long, conspicuous; corolla rather large, lobes broadly falcate, ·4 in. long, ·25 in. broad; leaves ovate

or elliptic, with 3 pairs of main nerves; follicles short, curved upwards, up to 8 in. long, glabrous but roughly scurfy; seeds hollowed near the top.....1. *dichotoma*. Cymes densely corymbose; calyx-lobes linear, 3—4 in. long; corolla rather small, lobes ovate acuminate, 1.5—3 in. long; leaves elliptic or elliptic-lanceolate, acute or acuminate, sometimes (in dry regions) obtuse or even emarginate, with 5—8 pairs of main nerves; follicles straight, 6—9 in. long, tomentose at first, afterwards glabrous; seeds flat, slightly concave on one side.....2. *cymosa*.

1. AGANOSMA DICHOTOMA, K. Schum. *A. caryophyllata*, G. Don; F. B. I. iii. 662. *A. Blumei*, Wt. Ic. t. 1305, *not* of A. DC.

N. Circars, E. Deccan and Carnatic from Ganjam to the Rumpu Hills, Kondapalli in Kistna and the Nellore Veligondas.

A large climber with white corolla and red calyx lobes and leaves up to 4 in. long, tomentose at first, afterwards glabrescent.

2. AGANOSMA CYMOSA, G. Don; F. B. I. iii. 663. *A. elegans*, G. Don; Wt. Ic. t. 1304. *A. Doniana*, Wt. Ic. t. 1306. *Echites cymosa*, Roxb.; Wt. Ic. t. 395. *Toxocarpus eriocarpus*, Hook. f.; F. B. I. iv. 15?

Deccan, Carnatic and W. Gháts, in forest Districts, up to 5,000 ft.

A large rambling climber with pale yellow flowers variable in size, and leaves also variable, up to 5 in. long but usually less.

19. *Anodendron*, A. DC.

Glabrous climbing shrubs. *Leaves* opposite with distant nerves. *Flowers* small, in axillary or axillary and terminal spreading paniculate cymes; bracts small. *Calyx* small, 5-lobed, usually without glands. *Corolla* salver-shaped; tube cylindric, little dilated opposite the stamens, the mouth contracted; lobes 5, overlapping to the right, twisted to the left. *Stamens* included, below the middle of the corolla-tube; anthers sagittate, connivent round and adherent to the stigma; cells shortly spurred at base. *Disk* cup-shaped. *Ovary* of 2 distinct carpels, sunk in the disk and dorsally adnate to it; ovules many; style short; stigma thick, conical. *Fruit* of 2 diverging, hard, acuminate, follicular mericarps. *Seeds* ovoid or oblong, compressed, beaked, tipped with a long silky coma; albumen scanty; cotyledons oblong, flat, leafy; radicle cylindric, superior.

ANODENDRON PANICULATUM, A. DC.; F. B. I. iii. 668; Wt. Ic. t. 1309, *fruit and seeds only*. *Echites paniculata*, Roxb.; Wt. Ic. t. 396.

N. Circars, in Ganjam (Barber); Deccan, in Mysore; W. Gháts from S. Canara and Coorg to Travancore, in the low country in dry open forests.

A very large climber with large panicles of small yellow flowers, elliptic or oblong abruptly acuminate leaves with 12—15 pairs of regular prominent main nerves, and follicles 6 in. long, the seeds long-beaked. Vern. *Mar. Lamtani*.

20. *Ichnocarpus*, R. Br.

Climbing shrubs with slender branches. *Leaves* opposite. *Flowers* small, in lax terminal and axillary paniculate cymes. *Calyx* 5-lobed, glandular or not within. *Corolla* salver-shaped, the throat contracted

or villous, lobes overlapping to the right, the upper half deflexed in bud. *Stamens* inserted at or below the middle of the tube; filaments very short; anthers sagittate, conniving over and adhering to the stigma; cells spurred at the base. *Disk* free, with 5 erect disk glands. *Ovary* of 2 distinct carpels; ovules many; style short, the top obconic; stigma columnar. *Fruit* of 2 slender, spreading or divaricate, follicular mericarps. *Seeds* narrowed at the tip, crowned with a deciduous silky coma; albumen scanty; cotyledons long, flat; radicle short, superior.

ICHNOCARPUS FRUTESCENS, R. Br.; F. B. I. iii. 669; Wt. Ic. t. 420.

All Districts in the plains and lower hills, in forests, hedgerows and open places, common.

A much-branched, extensively climbing, rusty-villous shrub with elliptic or lanceolate leaves up to 3 in. long, 1.5 in. broad, greenish-white flowers and slender follicles.

Allamanda cathartica, Linn., is a handsome climbing shrub from S. America, with large yellow flowers and whorled leaves, frequently grown in gardens in the plains, and sometimes, as along backwaters in Travancore, found run wild.

Thevetia nerifolia, Juss., is another S. American plant, an erect bush or small tree with large yellow flowers, linear alternate leaves and a rounded somewhat angular apple-like fruit, very common in gardens and occasionally found run wild near towns and villages.

Plumeria acutifolia, Poir., is the Pagoda tree, probably also from tropical America, a common and conspicuous garden plant with thick fleshy branchlets and green oblong leaves, the flowers white with a pale yellow centre, very fragrant and used for garlands for the temples. *P. alba*, Linn., is also found in similar places in cultivation. It has large white flowers and thick reticulate leaves.

Kopsia fruticosa, A. DC., is a large evergreen shrub, native of Burma, common in gardens. It has pretty pink flowers and rather thin elliptic-lanceolate leaves.

Nerium odorum, Soland, the Indian Oleander, is a large shrub, common in rocky river beds in N. India, but not found wild, except perhaps as an escape, in Madras. It is often cultivated in gardens and has pink flowers, narrow linear coriaceous leaves and long follicles with brown coma to the seeds.

Family C. ASCLEPIADACEAE.

Herbs or shrubs, usually twining, the stems usually woody, sometimes succulent. *Leaves* opposite or whorled, rarely alternate, sometimes wanting; stipules 0. *Flowers* hermaphrodite, regular, solitary or few or many together, usually in axillary, sometimes terminal, umbelliform cymes; bracts usually small or wanting. *Calyx* inferior, usually deeply 5-lobed, the lobes imbricate, usually with glandular scales at the base within. *Corolla* various, gamopetalous, 5-lobed; tube usually short (long in *Ceropegia*), often furnished within with processes forming a *corolline corona*; lobes imbricate, contorted or valvate, often recurved, sometimes erect and connate at their tips. *Stamens* 5, inserted at or

FLORA OF MADRAS.

use of the corolla and alternating with its lobes; filaments
 usually connate in a *staminal-column* with its apex united
 and part of the style; usually with more or less fleshy pro-
 cesses back forming a *staminal corona*; anthers 2-celled, the
 lobes by longitudinal or transverse slits, the tips often produced
 into membranes; pollen contents of each anther-cell granular
 to one or two *pollen-masses*; when granular each granule
 about 4 grains loosely united and contained in a spoon- or
 ppendicle, attached by a *caudicle* to the *pollen-carrier* on
 the style; when united, the pollen-masses of two adjacent but
 separate cells either sessile on or connected by arm-like *caudicles*
 at the style-apex. *Ovary* of 2 1-celled many-ovuled carpels, the styles
 slender and dilated in the style-apex bearing the pollen-carriers
 above and beneath them the 5 stigmatic cavities. *Fruit* of 2
 (compression) follicular mericarps, dehiscent by the ventral
 suture usually liberating the placenta. *Seeds* usually flat, some-
 times cylindrical, often marginal, crowned with a *coma* of long
 testa thin or thick, alhumen usually thin; embryo large;
 radicle superior, usually cylindrical.

granular, loosely contained in the more or less spatulate appendices,
 attached by a long or short caudicle to a gland which itself is attached
 to the style-apex (Tribe I. PERIPLOCEAE):—

Pollen-masses connate with the corolla:—
 Shorter than the lobes:—

Lobes valvate.....1. **Hemidesmus.**

Lobes imbricate, overlapping to the right.....2. **Cryptolepis.**

As long as or longer than the lobes..... **Cryptostegia.**

Pollen-masses connate with the stamens:—

Between the stamens; corolla rotate:—

With clustered narrow leaves; filaments short, slender.....3. **Utleria.**

With opposite elliptic leaves; filaments very short, broad

4. **Brachylepis.**

Pollen-masses between the stamens:—

Lobes valvate in bud.....5. **Decalepis.**

Lobes imbricate in bud.....6. **Streptocaulon.**

4 or 2, minute, waxy, sessile on a minute, soft pollen-carrier (Tribe

II):—

Imbricate in bud:—

Lobes small, overlapping to right or left; style-apex short, rounded,

Lobes small, narrow, linear.....7. **Secamone.**

Lobes elongate, overlapping to the left; style-apex elongate, conical or

Lobes broad.....8. **Toxocarpus.**

Lobes valvate in bud, villous within, of 2 forms; style-apex with a broad

Process above it; leaves broad.....9. **Genianthus.**

Waxy, opaque, without pellucid margin, attached in pairs by caudi-

cles black-coloured horny pollen-carriers:—

Pollen-masses pendulous (Tribe III. CYNANCHEAE):—

Corolla lobes valvate in bud:—

Processes laterally compressed.....10. **Calotropis.**

Processes hooded, with a protruding horn.....11. **Asclepias.**

Lobes imbricate; corolla-lobes more or less overlapping in bud:—

Single:—

Corolla large:—

Corolla thin, with a pubescent ring at its base; corona-processes dilated

Base, acuminate at tip; follicles slender.....12. **Oxystelma.**

Corolla thick, glabrous; corona annular, fleshy.....13. **Holostemma.**

- Flowers small; corolla rotate or campanulate:—
 Corona of 5 erect laterally compressed processes with an upcurved spur at base.....14. **Pentatropis**.
 Corona annular or tubular, plicate, toothed or lobed.....15. **Cynanchum**.
 Corona double, the outer membranous, annular or cupular, the inner of processes attached to the staminal column:—
 Leafy twiners; follicles softly echinate.....16. **Pergularia**.
 Leafless fleshy stragglers; follicles smooth.....17. **Sarcostemma**.
 Pollen-masses erect or horizontal, very rarely pendulous (Tribe IV. **MARSDENIEAE**):—
 Corona single, corolline.....18. **Gymnema**.
 Corona-processes adnate to the staminal column:—
 Corolla-tubes overlapping:—
 Corona of 5 distinct processes;—
 Corona-lobes tubercle-like, radiating from the base of the staminal column and quite adnate to it; pollen-masses usually horizontal...19. **Tylophora**.
 Corona-lobes with the base adnate to the staminal column, free above; pollen-masses erect:—
 Corona-lobes with a subulate process on the inner face...20. **Telosma**.
 Corona-lobes without a process on the inner face.....21. **Marsdenia**.
 Corona-lobes scale-like, bifid at apex; style-apex with a rim.....22. **Cosmostigma**.
 Corolla-tubes valvate:—
 Corolla urceolate or disciform; corona cupular, fleshy, usually with an inner process.....23. **Oianthus**.
 Corolla rotate:—
 Leaves thin; corona spreading, usually with an inner process.....24. **Heterostemma**.
 Leaves thick and fleshy; corona large, stellate.....25. **Hoya**.
 Pollen masses waxy, pellucid on one margin or at apex, attached in pairs by caudicles to the usually dark-coloured pollen-carriers; corolla-lobes valvate (Tribe V. **CEROPEGIEAE**):—
 Corona double; corolline of processes in the sinuses of the lobes, staminal annular.....26. **Leptadenia**.
 Corona staminal, annular, single or double, usually with 5 processes which overlap the anthers:—
 Leafy herbs with terete stems and branches:—
 Corolla-tube campanulate-rotate, with narrow lobes; corona single, staminal, annular; slender plants with linear leaves.....27. **Brachystelma**.
 Corolla-tube long, the lobes usually cohering at tip; corona double, staminal, outer annular, inner of incurved or erect processes; erect or twining herbs.....28. **Ceropegia**.
 Leafless herbs with fleshy 4-angled stems and branches; corona double, the outer annular, the inner of inflexed processes.....29. **Caralluma**.

1. *Hemidesmus*, R. Br.

Twining undershrub. *Leaves* opposite or in whorls of 4. *Flowers* small, greenish-purple, in axillary opposite crowded subsessile cymes. *Calyx* 5-partite; lobes acuminate, with 5 minute scales at their bases within. *Corolla* rotate, deeply 5-fid, with valvate fleshy lobes; corona-scales 5, thick, on the corolla-lobes and alternate with them. *Stamens* inserted at the base of the corolla-tube; filaments distinct or subconnate at the base; anthers small, cohering at the apex, ending in inflexed appendages; pollen-masses cohering in pairs in each cell, granular, the caudicles of the pollen-carriers bearing cucullate or spreading appendages. *Ovary* of 2 many-ovuled carpels; styles distinct, style-apex 5-lobed, flat on top. *Fruit* of 2 slender divaricate terete follicular mericarps. *Seeds* oblong, flattened, ridged ventrally, ending in a long white silky coma; cotyledons oblong; radicle cylindric.

HEMIDESMUS INDICUS, R. Br.; F. B. I. iv. 4; W. & A. Contrib. 63; Wt. Ic. t. 594.

All plains Districts, in open forests, waste places and hedges, common.

A much-twining wiry shrub with polymorphous leaves varying from elliptic or almost orbicular and obtuse to long linear and narrow. The follicles are long and slender often up to 8 in. in length. Vern. *Tam.* Nannari; *Tel.* Sugandapala.

Var. *pubescens*, Hook. f. *H. pubescens*, W. & A. Contrib. 63; Wt. Ic. t. 1320.

Branchlets, leaves beneath and inflorescence pubescent, the leaves variable as in the species.

N. Circars, Deccan and Carnatic from Vizagapatam to Madras.

2. *Cryptolepis*, R. Br.

Twining glabrous shrubs. *Leaves* opposite. *Flowers* in lax, slender, dichotomous, few-flowered, peduncled, terminal or axillary cymes; bracts and bracteoles small. *Calyx* deeply 5-fid with 5-scales within near the base. *Corolla*-tube short, cylindric or campanulate; lobes 5, linear, overlapping and twisted to the right in bud; corona-scales 5, linear or clavate, inserted near or above the middle of the tube. *Stamens* 5, attached near the base of the corolla-tube; filaments subconnate by broad bases; anthers short, adhering to the style-apex by their bases, the tips acuminate, connivent; pollen-masses cohering in pairs in each cell, granular, appendices of pollen-carriers oblong. *Ovary* of 2 many-ovuled carpels; styles distinct, style-apex shortly conical. *Fruit* of 2 divaricate, smooth, follicular mericarps. *Seeds* oblong, flattened, ending in a long white silky coma; cotyledons elliptic; radicle long.

Main nerves of the leaves many, nearly horizontal and parallel, meeting in an intra-marginal ring, the leaves elliptic or elliptic-oblong with an abrupt apiculus, up to 7 in. long, and even 4 in. broad; peduncles very short, corolla-lobes 3 in. long; follicles stout, 2—4 in. long, lanceolate.....1. *Buchanani*. Main nerves of the leaves not horizontal and parallel, usually curved upwards; peduncles long; follicles long and narrow:—

Leaves ovate, obtuse or acute and apiculate, up to 4 in. long, 1.5 in. broad, main nerves about 5—6 pairs; peduncles 1.5 in. long; corolla-lobes 4—6 in. long; follicles linear lanceolate, 4 in. long, 3—5 in. broad.....2. *grandiflora*. Leaves oblong or oblong-lanceolate, apiculate, obtuse or even cordate at base, up to 3 in. long, 1—1.5 in. broad, main nerves about 7 pairs; peduncles 1 in. long; corolla-lobes 4 in. long; follicles very slender, up to 8 in. long, 2 in. broad. 3. *elegans*.

1. *CRYPTOLEPIS BUCHANANI*, Roem. & Sch.; F. B. I. iv. 5; Wt. Ic. t. 494. N. Circars, Deccan, Carnatic and W. Coast, in deciduous forests and in hedges.

A large much-branched climber with white flowers and leaves nearly white beneath. Bark purplish-red, peeling off in papery flakes; wood white. Vern. *Hind.* Karanta; *Tel.* Adivi pala tiga.

2. *CRYPTOLEPIS GRANDIFLORA*, Wt. Ic. t. 831; F. B. I. iv. 5. Deccan, forests of the Ceded Districts; hills of the Carnatic, south to Tinnevely.

A slender climber with rather large flowers, narrow divaricate follicles and rather thick leaves, the reticulation impressed above.

3. *CRYPTOLEPIS ELEGANS*, Wall. ; F. B. I. iv. 6. *C. pauciflora*, Wt. Ic. t. 493.

N. Circars, hills of Ganjam to Godavari (A. W. Lushington, Barber, etc.).

A slender wiry climber with thin leaves, yellow flowers and very narrow follicles often divaricate to lie in one straight line.

3. *Uleria*, Bedd.

A glabrous shrub. *Leaves* opposite, whorled or scattered, linear-lanceolate, subcrenulate, clustered at the ends of the thick branchlets. *Flowers* small, in terminal or axillary, long-peduncled, glabrous, dichotomous cymes, among the leaves at the ends of the branchlets. *Calyx* very small; lobes 5, ovate, each with 2 minute glands. *Corolla* rotate; lobes 5, slightly overlapping and twisted to the right; corona-scales 5, small, rounded. *Stamens* inserted on the base of the corolla-tube; filaments short; anthers ovate, tip pointed, connivent over and adherent to the style-apex; pollen-masses in pairs in each cell, granular, the appendices of the pollen-carriers short, rounded. *Ovary* of 2 many-ovuled carpels; style-apex convex on the top. *Fruit* of 2 smooth lanceolate divaricate follicular mericarps. *Seeds* broadly ovate, thin, tipped with a white coma.

UTLERIA SALICIFOLIA, Bedd. ; F. B. I. iv. 7 ; Hook. Ic. t. 1432.

W. Gháts, Anamalai Hills, at 3,000—5,000 ft. (Beddome, Fischer).

A shrub, up to 4.5 ft. high, growing among or in fissures of the rocks (Fischer), on open rocky ground, a small tree (Bedd.). Bark thick, grey, papery; wood white. The leaves are narrowly lanceolate, usually 3—4 in., sometimes up to 9 in. long, the mericarps 2 in. long, glabrous. Vern. *Kader Utleer* (Bedd.).

4. *Brachylepis*, W. & A.

A climbing shrub with pubescent branches and villous inflorescence. *Leaves* opposite. *Flowers* small, in terminal or axillary dichotomous bracteate cymes. *Calyx* deeply 5-fid, with 5 small glands between the ovate lobes within. *Corolla* rotate, 5-lobed, the lobes slightly overlapping to the right; corona of five broad membranous scales. *Stamens* inserted on the throat of the corolla, with very short broad filaments; anthers attached to the style-apex and inflexed to enclose it; pollen-masses in pairs in each cell, granular, the appendices of the pollen-carriers minute, funnel-shaped. *Ovary* of 2 many-ovuled carpels; style-apex flat on the top. *Fruit* of 2 divaricate, acuminate, thick, smooth, follicular mericarps. *Seeds* ovate oblong, ridged ventrally, tipped with a long white coma, cotyledons elliptic, flat, radicle cylindric.

BRACHYLEPIS NERVOSA, W. & A. Contrib. 64 ; F. B. I. iv. 7 ; Wt. Ic. t. 1284, Spic. Neilgh. t. 156.

W. Gháts, Nilgiri Hills at 5,000—7,500 ft.

A wiry climber, the corolla green without purple within, the leaves thick, elliptic, acute or acuminate, with 8—10 pairs of strong main nerves, the follicles narrow-lanceolate about 3 in. long, divaricate in a nearly straight line.

5. *Decalepis*, W. & A.

A glabrous twining shrub, the branches jointed. *Leaves* opposite. *Flowers* small, in axillary peduncled cymes. *Calyx* deeply 5-fid, eglandular. *Corolla* rotate; lobes 5, valvate, white-villous within; corona of 10 scales, alternately long and hooded and short triangular flat. *Stamens* at the base of the corolla, alternating with triangular glands; filaments distinct but cohering at the base with the glands between; anthers ovate, conniving over and adnate to the style-apex, the tips acute, inflexed; pollen-masses granular, in pairs, appendices of pollen-carriers shovel-shaped. *Ovary* of 2 many-ovuled carpels; styles distinct; style-apex convex, 5-grooved. *Fruit* of 2 thick lanceolate short follicular mericarps. *Seeds* shortly ovate, ridged, tipped with a white coma.

DECALEPIS HAMILTONII, W. & A. Contrib. 64; F. B. I. iv. 11; Wt. Ic. t. 1285.

Deccan, Horsleykonda, at 4,500 ft. (Gamble), Madanapalle in Chittoor at 3,000 ft., hills of N. Coimbatore (Fischer); Carnatic, Veligonda Hills of Nellore (Ramaswami), Kambakam Hills of Chingleput; W. Gháts, Anamalais (Wight, Barber).

A climber with orbicular or elliptic-obovate leaves, about 2 in. long, the main nerves about 6 pairs, arched; the follicles 2·5 in. long, .75 in. in diam.

6. *Streptocaulon*, W. & A.

Twining herbs or shrubs, usually tomentose. *Leaves* opposite. *Flowers* small, in lax sessile or peduncled trichotomous cymes in one axil of a pair of leaves. *Calyx* minute, 5-lobed, glandular within. *Corolla* rotate; lobes ovate, slightly overlapping to the right; corona-scales 5, filiform, adnate to the backs of the filaments. *Stamens* inserted at the base of the corolla; filaments very short alternating with minute glands; anthers conniving over and adherent to the style apex; pollen-masses in pairs in each cell, granular; appendices of pollen-carriers spatulate. *Ovary* of 2 distinct carpels; style-apex 5-angled, convex at top. *Fruit* of 2 divaricate follicular mericarps. *Seeds* flattened, keeled ventrally, tips with a long white silky coma; cotyledons oblong, flat; radicle long.

STREPTOCAULON KLEINII, W. & A. in Wt. Contrib. 65; F. B. I. iv. 9.

S. India, locality not known (Wight).

A climber with panduriform leaves rugose above and densely white tomentose beneath, the cymes with peduncles about 1 in. long, few-flowered.

7. *Secamone*, R. Br.

Climbing or straggling shrubs or undershrubs. *Leaves* opposite. *Flowers* small or minute, in lax axillary, sessile or shortly peduncled, 2—3-choromous cymes. *Calyx* 5-lobed, eglandular. *Corolla* small, rotate, 5-lobed, the lobes overlapping to right or left; corona-scales 5, adnate to the staminal column, compressed. *Stamens* inserted at the base of the corolla; filaments short, free or connate at base; anther-tips inflexed and connivent round the style-apex; pollen-masses small, in pairs in each cell, attached in fours to a minute pollen-carrier

without caudicles. *Ovary* of 2 carpels, many-ovuled; style columnar, dilated, ending in a flattened ring and produced above it. *Fruit* of 2 divaricate follicular mericarps, smooth. *Seeds* oblong, flattened but ridged, ending in a long white silky coma; cotyledons linear-oblong; radicle nearly as long, cylindric.

SECAMONE EMETICA, R. Br.; F. B. I. iv. 13; Wt. Contrib. 60; Wt. Ic. t. 1283.

Deccan and Carnatic, in hilly regions from Nellore to Coimbatore, south to Tinnevely, up to 4,500 ft. on Horsleykonda.

A wiry much-branched climbing shrub with minute flowers, narrow linear leaves, and slender follicles about 2—2.5 in. long. Bark brown, thick, corky and deeply cleft; wood white.

8. *Toxicarpus*, W. & A. in part.

Twining shrubs. *Leaves* opposite. *Flowers* small or moderate-sized, in axillary dichotomous paniculate or racemose cymes. *Calyx* very small, 5-lobed, with or without minute scales at the base within. *Corolla*-tube short, usually campanulate, 5-lobed, the lobes linear-oblong, overlapping to the left; corona-scales attached to the staminal tube, flattened, sometimes with an inner flap. *Stamens* inserted at the base of the corolla; filaments connate; anthers small, minutely fimbriate at tip; pollen-masses very minute, pendulous, apparently in pairs attached to minute soft pollen-carriers, without caudicles. *Ovary* of 2 carpels; style slender, style-apex long and slender or clavate. *Fruit* of 2 divaricate follicular mericarps. *Seeds* oblong, flattened, tipped with a silky coma; cotyledons oblong; radicle cylindric.

Corona-scales shorter than the stamens, acute:—

Corolla .2 in. long, leaves ovate, abruptly acute, thin, glabrous, up to 3 in. long, 2 in. broad, main nerves about 5 pairs.....1. *Roxburghii*.
Corolla .4 in. long; leaves elliptic or elliptic-obovate, abruptly acuminate, nearly glabrous, up to 4.5 in. long, 2 in. broad, main nerves 6—7 pairs...2. *palghatensis*.

Corona-scales longer than the stamens, obtuse:—

Corolla .35 in. long, the tube short, villous within; leaves lanceolate or elliptic-lanceolate, acuminate, cuneate at base, glabrous, 4 in. long, 1.5 in. broad, the main nerves 7 pairs.....3. *Beddomei*.
Corolla .5 in. long, the tube short, glabrous within; leaves ovate, acuminate, rounded at base, usually glandular-pubescent beneath, up to 3 in. long, 1.5 in. broad, main nerves 4—5 pairs; follicles very slender, acuminate, 6 in. long.
4. *Kleinii*.

1. *TOXOCARPUS ROXBURGHII*, W. & A. in Wt. Contrib. 61; F. B. I. iv. 14; Wt. Ic. t. 475.

N. Circars? (Heyne).

A slender climber with pale yellow fragrant flowers (Roxb.).

2. *TOXOCARPUS PALGHATENSIS*, Gamble in Kew Bull. 1922, 119.

W. Gháts, Palghat Hills of Malabar at 3,500 ft. (Beddome).

A slender climber with smooth leaves and much nearly black furfuraceous tomentum on the younger parts.

3. *TOXOCARPUS BEDDOMEI*, Gamble in Kew Bull. 1922, 119.

W. Gháts, Atraimalai Hills of Tinnevely (Beddome).

A slender climber, the leaves smooth and pale when dry.

4. *TOXOCARPUS KLEINII*, W. & A. Contrib. 61; F. B. I. iv. 14; Wt. Ic. t. 886.

N. Circars, on the Godavari (Barber); Carnatic, hills of Trichinopoly; W. Gháts, Nilgiris, hills of Cochin.

A slender climbing shrub, the stem, inflorescence and under-surface of leaves rufous-villous, the follicles curved and long-beaked.

9. *Genianthus*, Hook. f.

Twining shrubs. *Leaves* opposite. *Flowers* small, in axillary usually di- or tri-chotomous cymes. *Calyx* very small, 5-lobed, with minute scales at the base within. *Corolla* rotate; tube short; lobes spreading or recurved, villous within, valvate in bud; corona-scales 5, flattened, attached to the staminal tube. *Stamens* in a column, the anthers erect, appendages short; pollen-masses 2 in each cell, granular, on a small pollen-carrier, without caudicles. *Ovary* of 2 carpels; style with a broad apex, usually produced above it. *Fruit* of 2 follicular mericarps, slender and usually curved. *Seeds* flattened, with a long silky coma.

GENIANTHUS LAURIFOLIUS, Hook. f.; F. B. I. iv. 16. *Toxocarpus laurifolius*, Wt.; W. & A. Contrib. 61; Wt. Ic. t. 598.

S. Canara, at Jahlsur (Barber).

A slender climbing shrub with broadly elliptic, shortly acuminate leaves with 6—7 pairs of curved main nerves, flowers of 2 forms, one with short recurved densely bearded corolla-lobes, the others with broader erect pubescent ones, the latter apparently the fertile ones, and terete slender follicles 3—5 in. long.

10. *Calotropis*, R. Br.

Large erect shrubs or small trees. *Leaves* opposite, broad. *Flowers* medium-sized, in umbellate or racemose lateral pedunculate cymes. *Calyx*-5-lobed; lobes broadly ovate, glandular within. *Corolla* broadly campanulate or subrotate, divided more than halfway down in 5 valvate lobes; corona scales 5, fleshy, adnate to and radiating from the large staminal column, with an upcurved involute spur or two obtuse auricles. *Stamens* inserted at the base of the corolla; anthers short, broad, somewhat horny at the angled wings; appendages short, broad, inflexed over the style-apex; anther-cells a shallow pouch; pollen-masses solitary, flattened, pendulous, attached by slender caudicles to the oblong pollen-carriers. *Ovary* of 2 distinct carpels; style slender with a depressed pentagonal style-apex. *Fruit* of 2 large, inflated, fleshy, thick follicular mericarps. *Seeds* ovate, plano-convex, the broad apex surmounted by a coma of long slender silky hairs.

Corolla-lobes spreading, pale lavender; corona-scales narrow, shorter than the staminal column, with pubescent back, the entire apex with 2 obtuse auricles below it, the spur upcurved involute.....1. *gigantea*.
Corolla-lobes erect, pink and purple spotted; corona-scales, equal to or longer than the staminal column, glabrous on the back, the apex bifid without auricles, the spur upcurved acute.....2. *procera*.

1. CALOTROPIS GIGANTEA, R. Br.; F. B. I. iv. 17; W. & A. Contrib. 53.

All plains Districts in waste places and on roadsides, often on black cotton soil.

A large milky shrub, very pale in colour, the branches and leaves and inflorescence covered with loose soft white wool, the large sessile leaves ovate or obovate, cordate at base, the flowers large and pale, the large fleshy follicles green and ventricose, the seeds with an abundant white milky coma. Bark yellowish-white; wood white and soft. The bark gives a strong fibre and the silky coma is used to stuff pillows. Vern. *Hind.* Mudár, Ak.; *Ur.* Uruk; *Tel.* Jilledu; *Tam.* Erukku, Yerikan; *Mal.* Yerikku.

2. CALOTROPIS PROCERA, R. Br.; F. B. I. iv. 18; Wt. Ic. t. 1278.

Most plains Districts, as the preceding, usually in drier localities. A milky shrub, smaller in size than the preceding and like it except as regards the flowers. The uses are the same. Vern. *Hind.* Mudár, Ak.; *Tel.* Jilledu.

11. *Asclepias*, Linn.

Perennial herbs or shrubs, often with tuberous roots. *Leaves* opposite or whorled. *Flowers* moderate-sized, in umbellate cymes. *Calyx* deeply 5-partite, 5--10-glandular within at the base. *Corolla* rotate, deeply 5-lobed; lobes valvate or slightly overlapping, often reflexed; corona-scales 5, arising from the staminal column and adnate to it above, concave-cucullate with sometimes a horn protruding from within. *Stamens* adnate near the base of the corolla, the filaments connate in a tube; anthers with a membranous tip over the style-apex; pollen-masses pendulous, flattened, solitary, attached by often curved caudicles to the hard pollen-carriers. *Ovary* of 2 distinct carpels; styles free below, connected above; style-apex columnar, truncate or depressed at tip. *Fruit* of 2 smooth usually beaked and inflated follicular mericarps, often more or less covered with subulate hairs. *Seeds* flattened, winged, ending in a silky coma; cotyledons elliptic, radicle as long.

ASCLEPIAS CURASSAVICA, Linn.; F. B. I. iv. 18.

Most plains Districts, in waste places and on roadsides; a tropical American plant, run wild and now common; often planted in gardens.

An erect herb with narrowly lanceolate leaves, bright orange-red flowers and beaked and stalked follicles about 3 in. long.

A. physocarpa, Schlecht., is a shrubby plant found in gardens and sometimes run wild in the Nilgiri Hills. The large, usually obtuse, inflated follicles have sparse long setae on their sides.

12. *Oxystelma*, R. Br.

Glabrous twining herbs or undershrubs. *Leaves* opposite, narrow. *Flowers* large, in lax racemose or subumbellate cymes or solitary; pedicels filiform. *Calyx* small, 5-partite, with a row of glands at the base within. *Corolla* broadly rotate, lobed half-way down and with a densely pubescent ring (corolline corona of some authors) at its base; lobes triangular, ciliate, valvate at base, shortly overlapping to the right

in bud; corona-processes adnate to the staminal tube, the bases dilated, the tips acuminate. *Stamens* with the filaments connate in a tube; anthers erect, with a short membranous inflexed appendage; pollen-masses waxy, pendulous, elongate-clavate, attached in pairs by slender caudicles to the hard brown shortly oblong pollen-carriers. *Ovary* of 2 many-ovuled carpels; style short, the apex truncate or convex. *Fruit* of 2 (1 usually absent) rather short, smooth or winged follicular mericarps. *Seeds* small, ovoid, winged on the margins, ending in a silky coma; cotyledons suborbicular; radicle short.

OXYSTEMMA ESCULENTUM, R. Br.; W. & A. Contrib. 54; F. B. I. iv. 17. *Periploca esculenta*, Roxb. Cor. Pl. t. 11.

N. Circars and Carnatic, in hedges and among bushes, usually near water; less common in the Deccan, common in S. Travancore along water-courses.

A very pretty graceful twining herb with narrow linear-lanceolate leaves, widely open flowers with a white or rose corolla marked with purple veins, and lanceolate acuminate follicles rounded at base and winged. Vern. *Hind.* Kirni, Dudhi; *Tel.* Dudhi pala.

13. *Holostemma*, R. Br.

Glabrous twining shrubs. *Leaves* opposite, cordate. *Flowers* large, purple, in few-flowered axillary cymes. *Calyx* 5-partite, eglandular. *Corolla* thick, subrotate, deeply 5-lobed, the lobes overlapping to the right; corona affixed to the base of the staminal column, annular, fleshy, truncate. *Stamens* adnate to the base of the corolla-tube, the filaments connate in a 10-winged column; anthers large, horny, shining, with membranous inflexed tips; pollen-masses pendulous, clavate, elongate, compressed, attached by long caudicles to the hard brown linear pollen-carriers. *Ovary* of 2 distinct carpels; style slender, style-apex oblong, 5-winged. *Fruit* of 1—2 thick lanceolate broad follicles. *Seeds* ovoid, flattened, winged, ending in a white silky coma.

HOLOSTEMMA ANNULARE, K. Schum.: *H. Rheedii*, Wall.; F. B. I. iv. 21; Wt. Contrib. 55, Ic. t. 597.

N. Circars, Deccan and Carnatic, in hedges and in open forests, especially in the hills, westwards to the lower slopes of the Ghâts; coast of S. Travancore.

A large climber with large conspicuous flowers, the corolla purple within, pink or white without, ovate deeply cordate acuminate leaves and a thick follicle 3·5 in. long, the second one often suppressed.

14. *Pentatropis*, R. Br.

Slender twining herbs or undershrubs. *Leaves* opposite, small. *Flowers* small, purplish, in lateral or axillary umbellate cymes; pedicels filiform. *Calyx* 5-partite, usually glandular within; lobes acute. *Corolla* rotate, divided nearly to the base; lobes elongate, overlapping to the right, twisted to the left; corona of 5 laterally compressed scales adnate to the backs of the anthers and with an upcurved spur at the base.

Stamens 5, in a short column from the base of the corolla; anthers with membranous tips; pollen-masses pendulous, not compressed, waxy, attached by short caudicles to the oblong pollen-carriers. *Ovary* of 2 distinct carpels, many-ovuled; style slender, style-apex 5-angled, shortly cylindric, tip flat. *Fruit* of 2 lanceolate, beaked, follicular mericarps. *Seeds* ovoid, flattened, margined, ending in a white silky coma.

PENTATROPIS MICROPHYLLA, W. & A. in Wt. Contrib. 52; F. B. I. iv. 19; Wt. Ic. t. 352.

Deccan and Carnatic, in hedges and open forest land.

A very slender climber with small purplish corollas pubescent within, small ovate obtuse mucronate leaves and beaked follicles about 2·5 in. long.

15. Cynanchum, Linn.

Erect or twining herbs or shrubs. *Leaves* opposite, often with a second pair, stipule-like and smaller, alternating from the same node. *Flowers* small, greenish or purplish, in axillary, umbellate or corymbose, sessile or peduncled cymes. *Calyx* 5-partite, usually with glands at the base within. *Corolla* rotate or campanulate, 5-partite, the lobes slightly overlapping to the right in bud; corona membranous, adnate to the base of the staminal column, annular cupular or tubular, toothed or lobed at the top. *Stamens* 5, adnate to the base of the corolla-tube; filaments connate in a short column, anthers hardened, the appendages membranous, erect or inflexed; pollen-masses oblong, pendulous, attached by short caudicles to the horny pollen-carriers. *Ovary* of 2 carpels; styles free below; style-apex 5-angled, truncate rounded or conical. *Fruit* of 2 smooth follicular mericarps, often winged. *Seeds* plano-convex, margined, ending in a silky coma; cotyledons ovate; radicle nearly as long.

Follicles not winged, long-beaked; leaves broadly cordate at base with a deep open sinus, the basal lobes rounded, otherwise ovate, acute or acuminate, up to 3 in. long, 2 in. broad; stipular leaflets rounded; corolla-lobes narrowly lanceolate, ·1 in. long, spreading; corona tubular, plicate, with 5 lanceolate lobes and small teeth between them.....1. *pauciflorum*.

Follicles winged, acute or acuminate:—

Leaves very shortly cordate at base with small rounded, sometimes overlapping lobes and small sinus, otherwise linear or elliptic- or ovate-oblong, apiculate, glaucous beneath, up to 4 in. long, 1·5 or even 2 in. broad; stipular leaves small, often wanting; corolla-lobes erect or spreading, oblong, ·15 in. long; corona tubular, plicate, with 5 entire or toothed lobes with teeth between them.

2. *Callialata*.

Leaves truncate or shortly cordate at base, the lobes if cordate rounded with a shallow sinus, otherwise variable in shape, ovate or lanceolate, acuminate, pale but not glaucous beneath, up to 3 in. long, 1·5 or even 2 in. broad, the stipular leaves ovate apiculate; corolla-lobes reflexed ovate-oblong, ·15 in. long; corona short, cupular, plicate, irregularly crenately lobed.....3. *alatum*.

1. CYNANCHUM PAUCIFLORUM, R. Br.; F. B. I. iv. 23; Wt. Contrib. 56, Ic. t. 354.

Carnatic and the Eastern slopes of the W. Ghâts from the Pulneys southwards.

A herbaceous climber, glabrous, the flowers greenish tinged with pink.

2. *CYNANCHUM CALLIALATA*, Ham. in Wt. Contrib. 56; F. B. I. iv. 24; Wt. Ic. t. 1279.
N. Circars, hills of Ganjam and Vizagapatam; W. Gháts, in all Districts on W. side, up to 3,000 ft.; Shevaroy Hills of Salem (Bourne).
A herbaceous twining shrub, glabrous. The Circar specimens have mostly narrow leaves, and agree with *C. angustifolium*, W. & A. in Wt. Contrib. 57, which is hardly even a variety.
3. *CYNANCHUM ALATUM*, W. & A.; Wt. Contrib., 57, Ic. t. 1250 (but not so hairy); F. B. I. iv. 23.
W. Gháts, Nilgiris, Pulneys, Anamalais and hills of Tinnevely and Travancore up to 6,000 ft.
A slender twiner, branchlets and young leaves slightly pubescent.

16. *Pergularia*, Linn (not of other authors).

Twining pubescent or tomentose undershrubs. *Leaves* opposite, cordate. *Flowers* medium-sized, greenish-white, in axillary racemose or corymbose, pedunculate cymes; pedicels slender. *Calyx* 5-partite, 5-glandular, lobes acute. *Corolla*-tube short, campanulate or funnel-shaped; lobes 5, ovate, spreading, overlapping to the right in bud; corona double, the outer membranous, annular, 5-lobed, the lobes truncate or dentate, the inner of 5 erect, laterally compressed, lobes spurred at the base and produced above in long free often fimbriate tips curved over the style-apex. *Stamens* 5, adnate to the corolla-tube; filaments connate in a column; anther-appendages membranous, inflexed; pollen-masses waxy, pendulous, attached in pairs to the shining horny pollen-carriers without caudicles. *Ovary* of 2 distinct carpels; styles slender; style-apex slightly convex at top. *Fruit* of 2 lanceolate, acuminate, smooth or softly echinate, often recurved follicles. *Seeds* ovate, minutely pubescent, marginated, ending in a silky white coma; cotyledons suborbicular, radicle pointed.

PERGULARIA EXTENSA, N. E. Br. in Fl. Cap. iv. i. 758. *Daemia extensa*, R. Br.; F. B. I. iv. 20; Wt. Contrib. 59, Ic. t. 596.

N. Circars, Deccan and Carnatic, westwards to the E. slopes of the W. Gháts up to 3,000 ft., common.

A slender bad-smelling milky climber with hispid stems, greenish flowers, suborbicular cordate leaves and reflexed lanceolate follicles covered with soft spines. Vern. *Tam.* Belaparti.

17. *Sarcostemma*, R. Br.

Shrubs, with trailing leafless jointed stems and pendulous branches. *Flowers* small, in sessile terminal or lateral umbels. *Calyx* small, 5-partite, glandular or not within. *Corolla* rotate, deeply lobed; lobes 5, overlapping to the right in bud; corona double, the outer cupular, membranous, 5—10-lobed or -crenate, attached to the base of the staminal column, the inner of 5 erect fleshy compressed or rounded processes adnate to the stamens above and more or less to the outer corona below, rarely absent. *Stamens* adnate to the base of the corolla-tube; filaments forming a column; anthers with membranous inflexed

appendages; pollen-masses slender, curved, pendulous, attached by usually short caudicles to the hard pollen-carriers. *Ovary* of 2 carpels; styles slender; style-apex 5-angled, rounded or conical or fusiform at top. *Fruit* of 2 straight smooth follicular mericarps. *Seeds* flat, usually margined, the margins sometimes toothed at base; cotyledons fleshy, elliptic or oblong; radicle short or long.

Umbels always terminal, pedicels glabrous or slightly pubescent; inner corona longer than the anthers; follicles .5 in. long or less, slightly divaricate; seeds small, .25 in. long or less, the wings usually toothed below, radicle as long as the cotyledons:—

Style-apex rounded at top; follicles lanceolate, 4—5 in. long; seeds glabrous.

1. *brevistigma*.

Style-apex acuminate at top; follicles linear, 2.5—4 in. long; seeds pubescent

2. *intermedium*.

Umbels usually lateral, pedicels crispate villous; inner corona shorter than the anthers; follicles up to 9 in. long, recurved; seeds large, .3—4 in. long, glabrous, broadly margined and not toothed, radicle very short, the cotyledons long.

3. *Brunonianum*.

1. *SARCOSTEMMA BREVISTIGMA*, W. & A. in Wt. Contrib. 59; F. B. I. iv. 26; Wt. Ic. t. 595.

N. Circars, Deccan and Carnatic, in stony places chiefly, up to 4,500 ft. on Horsleykonda.

A jointed shrub trailing over bushes and rocks, the succulent stems up to .25 in. in diam. Vern. *Hind. Soma*.

2. *SARCOSTEMMA INTERMEDIUM*, Dcne; F. B. I. iv. 27. *S. viminale*, Wt. Contrib. 59, Ic. t. 1281, *not* of R. Br.

W. Deccan and Carnatic, Coimbatore to Tinnevely, in dry places.

A jointed shrub, similar to the last but rarer.

3. *SARCOSTEMMA BRUNONIANUM*, W. & A. in Wt. Contrib. 59; F. B. I. iv. 27; Wt. Ic. t. 1282; Bot. Mag. t. 6002.

W. Deccan, Coimbatore to the lower slopes of the Nilgiris and Pulneys, in dry forest lands.

A slender trailing plant with large follicles and seeds, the flowers white or yellow (Bot. Mag.)

18. *Gymnema*, R. Br.

Twining shrubs or undershrubs. *Leaves* opposite. *Flowers* small, in crowded axillary or lateral umbellate cymes. *Calyx* 5-partite, with or without glands within at the base. *Corolla* subrotate campanulate or urceolate; lobes subvalvate or narrowly overlapping to the right; corona 0 or of fleshy processes adnate to the tube and sometimes produced beyond it between the lobes. *Staminal-column* arising from the base of the corolla; anthers erect with short membranous appendages; pollen-masses erect, attached to the horny pollen-carriers by very short caudicles. *Ovary* of 2 carpels; styles free to near the top; style-apex large, conical clavate or capitate, exerted beyond the anthers. *Fruit* of 2 (or 1) smooth follicular mericarps. *Seeds* ovate, margined, ending in a silky coma; cotyledons elliptic; radicle cylindric.

Flowers very small; calyx-lobes short, ovate; corona of 5 fleshy processes exerted in the sinuses of the lobes and decurrent in villous ridges on the tube:—

Corolla .1 in. long; corona ridges long, the apical processes small; leaves thin, ovate elliptic or almost lanceolate, acute or shortly acuminate at apex, cuneate

rounded or sometimes cordate at base, pubescent or subglabrous, up to 2.5 in. long, 1.5 in. broad; follicles slender, up to 3 in. long; seeds .4 in. long, broadly margined.....1. *sylvestre*.

Corolla .15 in. long; corona ridges short, the apical processes large and thick; leaves thick, ovate, often broadly, acute at apex, rounded or cordate at base, densely rusty tomentose, up to 3 in. long, 2 in. broad; follicles slender, up to 2.5 in. long; seeds .3—3.5 in. long, narrowly margined.....2. *hirsutum*.

Flowers larger; calyx-lobes linear-oblong; corona of villous ridges on the tube, but without fleshy processes in the sinuses of the lobes:—

Leaves membranous when dry, nearly glabrous, more or less ovate, acuminate at apex and cordate at base:—

Leaves broadly ovate or elliptic-ovate, abruptly acuminate, the base rounded or cordate, up to 7 in. long, 2.5—4 in. broad; umbels many-flowered, pedicels slender, .5 in. long; corolla .3—3.5 in. long.....3. *tingens*.

Leaves ovate, gradually acuminate, the base shallowly cordate, up to 4 in. long, 2—2.5 in. broad, the lowest two pairs of nerves from the base; umbels few-flowered, pedicels slender, .2 in. long; corolla .2 in. long.....4. *elegans*.

Leaves subcoriaceous, oblong or ovate-oblong or oblong-lanceolate, obtusely acuminate, rounded at base, 3—4 in. long, about 1 in. broad; umbels many-flowered, the rather stout pedicels .3 in. long; corolla .2—3 in. long.....5. *montanum*.

1. *GYMNEMA SYLVESTRE*, R. Br.; F. B. I. iv. 29; Wt. Contrib. 44, Ic. t. 349.

N. Circars, Deccan and Carnatic, in dry forests, up to about 2,000 ft. in the hills.

A large climber with small yellowish flowers. The leaves of this and the next species have the curious property of neutralising the taste of sugar. Vern. *Mar.* Kavali.

2. *GYMNEMA HIRSUTUM*, W. & A. in Wt. Contrib. 44; F. B. I. iv. 29; Wt. Ic. t. 1272. *G. Decaisneanum*, Wt. Ic. t. 1271.

W. Gháts, Nilgiris at 5,000—7,000 ft., common, hills of Travancore and Tinnevely at rather lower levels; hills of N. Coimbatore.

A large climber with spirally twisted stems and yellow flowers. Bark rough, brown; wood white, of irregular structure.

3. *GYMNEMA TINGENS*, W. & A. in Wt. Contrib. 45; F. B. I. iv. 31. *G. tingens* var. *cordifolia*, Wt. Ic. t. 593. *Asclepias tingens*, Roxb. Cor. Pl. t. 239

W. Gháts, Anamalai Hills at 4,000 ft. (Beddome).

A gigantic climber (Beddome), with pale yellow flowers, the follicles (in N. India) up to 7 in. long and nearly 1 in. broad.

4. *GYMNEMA ELEGANS*, W. & A. in Wt. Contrib. 46; F. B. I. iv. 32; Wt. Ic. t. 830.

Hills of S. Carnatic, from Salem to Tinnevely (*vide* Wight).

A rather slender climber with white flowers and lanceolate follicles 3 in. long, .5 in. broad.

5. *GYMNEMA MONTANUM*, Hook. f.; F. B. I. iv. 31. *G. tingens* var. *ovalifolia*, Wt. Ic. t. 592 (not good).

W. Gháts, Nilgiri and Anamalai Hills, at 4,000—7,000 ft.

A lovely creeper (Beddome) with pale yellow flowers and follicles 3 in. long and about .25—3.5 in. broad (Cooke).

19. Tylophora, R. Br.

Erect or twining perennial herbs or undershrubs. *Leaves* opposite. *Flowers* small, in axillary or lateral simple or branched umbelliform cymes of flower-clusters or short racemes scattered along them. *Calyx* 5-partite, glandular within; lobes ovate or lanceolate. *Corolla* rotate or rotate-campanulate, deeply 5-lobed, the lobes slightly overlapping to the right; corona of 5 small fleshy tubercular processes adnate to the lower part of the staminal-column. *Staminal-column* arising from the base of the corolla; anthers erect, small, with small inflexed membranous appendages; pollen-masses minute, usually horizontal, attached by their middle or near their base by very slender usually short caudicles to the pollen-carriers. *Ovary* of 2 carpels; style-apex pentagonal or 5-lobed, flattened or convex, rarely exserted. *Fruit* of 2 (or, by abortion, 1) follicular mericarps, smooth, usually acuminate. *Seeds* flattened, ovoid, margined, ending in a silky coma; cotyledons elliptic; radicle cylindric.

Stems erect or suberect, sometimes more or less climbing in the branchlets:—

Pollen-carriers very minute, caudicles short; anther-appendages inconspicuous; leaves ovate or lanceolate, long-petioled, up to 2 in. long, 1 in. broad:—

Corolla lobes very small, .05 in. long, lanceolate; corona-processes globose

1. *fasciculata*.

Corolla-lobes ovate-lanceolate, acuminate, .15 in. long; corona processes ovoid, pointed.....2. *macrantha*.

Pollen-carriers elongate, narrow, caudicles long and very slender; corona-processes ovoid, obtusely acute, shorter than the conspicuously appendaged anthers; leaves ovate or lanceolate, acuminate, up to 2.5 in. long, 1.5 in. broad.....3. *Iphisia*.

Stems always long and climbing:—

Stems, leaves and inflorescence glabrous; corona-processes subglobose, not pointed:—

Cymes elongate, divaricate, many-branched, up to 6 in. long and broad, corona-processes very minutely puberulous; leaves large, fleshy, elliptic or elliptic-ovate, apiculate, up to 6 in. long, 4 in. broad, the main nerves spreading, 7—8 pairs.....4. *zeylanica*.

Cymes short, sessile or peduncled, few-branched, usually umbellate; corona-processes glabrous:—

Leaves coriaceous, elliptic, elliptic-oblong or lanceolate, acute or apiculate, with 5—6 pairs of prominent main nerves, up to 4 in. long, 1.5 in. broad; flowers very minute, in sessile or shortly peduncled umbels with capillary pedicels.....5. *cappariifolia*.

Leaves fleshy when fresh, chartaceous when dry, ovate-elliptic or oblong or lanceolate, acute or apiculate, the main nerves indistinct, up to 2.5 in. long, 1 in. broad, petiole short; flowers minute, in shortly peduncled few-flowered cymes with capillary pedicels.....6. *tenuis*.

Leaves membranous, triangular-ovate, acute or acuminate, the main nerves indistinct, up to 4 in. long, 2 in. broad, petiole long; flowers small, in rather long peduncled few-flowered cymes with capillary pedicels

7. *pauciflora*.

Stems, leaves and inflorescence more or less pubescent:—

Corona-processes sub-globose, not pointed at apex; calyx-lobes hirsute:—

Stems trailing flat along the ground from a woody rootstock; leaves coriaceous, orbicular or broadly ovate, rounded or slightly acute, sometimes emarginate at apex, rounded or cordate at base, very shortly petioled, up to about 2.5 in. in diam.; flowers in many-flowered umbellate cymes, the long pedicels filiform.....8. *rotundifolia*.

Stems climbing, not trailing on the ground, densely softly tomentose, also the leaves; leaves elliptic-oblong or ovate, acute or abruptly apiculate, rounded or sometimes cordate at base, shortly petioled, up to 3 in. long, 2 in.

broad, but usually narrower; flowers minute in elongate spikes, often 3 in. long, of small, distant umbels, the pedicels short and filiform...9. *mollissima*. Corona-processes gibbous below, the apex with a free acuminate point; stems and leaves usually pubescent sometimes nearly or quite glabrous; leaves ovate or elliptic-oblong, acute or apiculate, rounded or cordate at base, up to 4 in. long, 2-2.5 in. broad; flowers rather large, in umbellate or racemose pedunculate cymes.....10. *asthmatica*. Corona-processes compressed, curved to an acuminate point; stems and leaves nearly glabrous, the leaves ovate cordate apiculate, about 7 in. long, 5 in. broad; flowers small, solitary, on capillary peduncles.....11. *cordifolia*.

1. *TYLOPHORA FASCICULATA*, Ham. in Wt. Contrib. 50; F. B. I. iv. 40; Wt. Ic. t. 848.
N. Circars, Deccan and Carnatic, usually at low levels, among grass.
A slender erect undershrub with thick fascicled roots, the upper branches often twining to some extent, the flowers minute with filiform pedicels. Follicles lanceolate, 1.5-2 in. long, .5 in. broad, seeds orbicular.
2. *TYLOPHORA MACRANTHA*, Hook. f.; F. B. I. iv. 40.
N. Circars, hills of Vizagapatam (Barber); Deccan, hilly country from Kurnool to N. Coimbatore; W. Gháts, Nilgiris, Pulneys and hills of Tinnevely, at 3,000-5,000 ft. in grass.
A slender erect undershrub with thick fascicled roots, the upper branches twining more or less, similar to No. 1 but with larger flowers and thicker pedicels.
3. *TYLOPHORA IPHISIA*, Dcne; F. B. I. iv. 40; Wt. Ic. t. 1276. *Iphisia multiflora*, W. & A. in Wt. Contrib. 52.
W. Gháts, Nilgiri Hills, at 6,000-7,000 ft.
A somewhat stout undershrub, erect at first, then climbing, the flowers dark purple, the follicles lanceolate acuminate, flattened, up to 3.5 in. long, the seeds oblong.
4. *TYLOPHORA ZEYLANICA*, Dcne; F. B. I. iv. 42.
W. Gháts, forests of Travancore, at 2,000 ft. (Beddome).
A superb and very large creeper (Beddome) with deep purple flowers, the follicles slender, up to 6 in. long, the seeds oblong-obovate.
5. *TYLOPHORA CAPPARIDIFOLIA*, W. & A. in Wt. Contrib. 51; F. B. I. iv. 41.
W. Gháts, from the Nilgiris to the hills of Tinnevely.
A much twining undershrub, the follicles slenderly lanceolate and long beaked, up to 4 in. long.
6. *TYLOPHORA TENUIS*, Blume; F. B. I. iv. 42, *T. carnos*a, Wall.; Wt. Contrib. 49, Ic. t. 351. *T. tenuissima*, W. & A., in Wt. Contrib. 49, Ic. t. 588.
W. Gháts, Pulney Hills and hills of Tinnevely, up to 7,000 ft.; W. Coast, along backwaters in Travancore.
A slender twining undershrub, the follicles linear-lanceolate, 2-3 in. long.
7. *TYLOPHORA PAUCIFLORA*, W. & A. in Wt. Contrib. 49; F. B. I. iv. 41; Wt. Ic. t. 1274.

Deccan, in S. Canara, Mysore and N. Coimbatore; W. Gháts, Pulney Hills and hills of Travancore and Tinnevely, up to about 3,000 ft.

A small climber with pale branches, the flowers apparently purplish.

8. *TYLOPHORA ROTUNDIFOLIA*, Harn. in Wt. Contrib. 50; F. B. I. iv. 43. N. Circars, Ganjam to Godavari, especially in Sal forest undergrowth; W. Gháts, Anamalais at 5,000 ft. (Beddome).

A curious plant, the follicles broadly ovate-fusiform, hard, about 2 in. long, the seeds nearly orbicular.

9. *TYLOPHORA MOLLISSIMA*, Wt. Contrib. 49; F. B. I. iv. 43; Wt. Ic. t. 1275.

W. Gháts, Pulney and Sirumalai Hills of Madura, up to 7,000 ft.

A slender climber, twining among bushes, the follicles narrowly lanceolate, 2—2.5 in. long, the seeds ovate-oblong with a rather short coma.

10. *TYLOPHORA ASTHMATICA*, W. & A. in Wt. Contrib. 51; F. B. I. iv. 44; Wt. Ic. t. 1277.

All plains Districts, common in hedges and open forests, up to about 3,000 ft. in hilly country.

A much-branching climber with long fleshy roots, variable leaves, greenish-yellow or greenish-purple flowers and lanceolate sharp-pointed follicles 3—4 in. long, the seeds ovate. The roots and leaves have been used as a substitute for *Ipecacuanha* (see Roxb., etc.). Vern. *Hind.* Antamul; *Tel.* Kaka palla.

11. *TYLOPHORA CORDIFOLIA*, Thw.; F. B. I. iv. 44.

Travancore, at Shencotta (M. Rama Rao).

A very slender small-leaved twining plant with dark purple corolla and slender follicles.

20. *Telosma*, Coville.

Twining undershrubs. *Leaves* opposite, usually cordate, membranous. *Flowers* rather large, yellow or greenish, in axillary umbelliform cymes. *Calyx* 5-partite, minutely glandular within; lobes lanceolate. *Corolla* somewhat salver-shaped, the tube swollen below, sometimes constricted at the throat; lobes oblong or linear, overlapping to the right, spreading in flower; corona-processes adnate to the back of the staminal column, erect, free above and sometimes 2-lamellate. *Staminal-column* arising from near the base of the corolla-tube; anthers with membranous tips; pollen-masses erect, waxy, attached to the pollen-carriers by short caudicles. *Ovary* of 2 carpels, style short; style-apex unbonate or capitate. *Fruit* of 2 lanceolate terete rather turgid follicular mericarps. *Seeds* ovate, concave, ending in a silky coma.

TELOSMA PALLIDA, Craib in Kew Bull. 1911, 418. *Pergularia pallida*, W. & A. in Wt. Contrib. 42; F. B. I. iv. 38; Wt. Ic. t. 585.

N. Circars, Simhachalam Hill, Vizagapatam (W. Elliot); Deccan, Hyderabad (J. Campbell), forests of Kurnool (Rangachari), Sandur Hills of Bellary (Gamble), foot of the Anamalai Hills (Beddome).

A slender climber with pale yellow nearly scentless flowers, a very membranous corona with rounded outer and lanceolate inner lamellae, long clavate pollen-masses, ovate-cordate acuminate leaves and long follicles.

Telosma minor, Craib, is a sweet-scented climber often grown in gardens in S. India and apparently sometimes found run wild, native of the Himalaya. It has greenish-yellow flowers, a corona which is spurred behind, short thick pollen-masses and ovate-cordate leaves with the basal lobes overlapping. The follicles are sometimes 6 in. long, linear-lanceolate, curved near the tip.

21. *Marsdenia*, R. Br.

Twining rarely erect shrubs. *Leaves* opposite. *Flowers* small or of moderate size, in terminal or axillary umbellate or corymbose cymes or panicles. *Calyx* 5-partite, usually with glands within at the base. *Corolla* campanulate urceolate or rotate, the lobes overlapping to the right in bud; corona-processes 5, membranous or hard or fleshy, adnate at the base to the staminal-column, free above. *Staminal-column* arising from the base of the corolla-tube; anthers erect, with membranous appendages more or less incumbent over the style-apex; pollen-masses erect, oblong, waxy, attached by usually short caudicles to the hard pollen-carriers. *Ovary* of 2 carpels; style short; style-apex large, convex or conical or depressed. *Fruit* of 2 (more usually 1 only, by abortion) lanceolate or dagger-shaped, acuminate follicular mericarps. *Seeds* ovate, flattened, margined, ending in a silky coma; cotyledons flat, ovate; radicle rather short.

Flowers in much corymbosely branching cymes; corona of erect slender hard processes bifid at apex; corolla villous without, glabrous within except for tufts of long hairs at the base, lobes reflexed and with incurved margins; leaves large, velvety, broadly ovate or orbicular, acuminate, cordate, up to 6 in. long, 4.5 in. broad. 1. *tenacissima*.
Flowers in few-branched, few-flowered cymes; corona of 2 membranous buttresses at base and a lanceolate tip; corolla glabrous, the lobes often emarginate; leaves membranous, glabrous, ovate or orbicular, acuminate, cordate, up to 5 in. long, 4 in. broad. 2. *Brunoniana*.
Flowers in umbellate, long-peduncled cymes with many green flowers on long pedicels; corona of large rounded fleshy lobes and a small apiculus behind the anther-tip; corolla rotate, glabrous; leaves broadly ovate or suborbicular, abruptly acuminate, cordate or truncate or rounded at base, glandular above the petiole, up to 6 in. long, 4.5 in. broad. 3. *volubilis*.

1. *MARSDENIA TENACISSIMA*, W. & A. in Wt. Contrib. 41; F. B. I. iv. 35; Wt. Ic. t. 590. *Asclepias tenacissima*, Roxb. Cor. Pl. t. 240.

W. Ghâts, Lower Pulneys, at 3,000 ft. (Rodriguez).

A stout climbing shrub with large follicles 4—6 in. long. Bark thick, yellowish grey; wood white. It gives a very strong silky fibre, used in Northern India for fishing lines and other purposes. Vern. *Hind.* Tongus, Jitti.

2. *MARSDENIA BRUNONIANA*, W. & A. in Wt. Contrib. 36; F. B. I. iv. 36; Wt. Ic. t. 356.

Canatic? near Columala (Kollimalais?) (Wight).

A twining shrub.

3. *MARSDENIA VOLUBILIS*, T. Cooke Fl. Bomb. ii. 166. *Dregea volubilis*, Benth. : F. B. I. iv. 46. *Hoya viridiflora*, R. Br. ; Wt. Contrib. 39, Ic. t. 586.

All Plains Districts and in the Hills up to 5,000 ft. in dry regions, common.

A large climbing shrub with green flowers and large woody follicles, blunt at the apex, 4 in. long and nearly 1 in. in breadth. Bark brown, rough, corky ; wood white, soft. The stems give a strong fibre. Vern. *Hind.* Nak-chikni ; *Mar.* Hirandoli, Ambri ; *Tam.* Kurincha.

22. *Coastostigma*, R. Br.

A twining glabrous shrub. *Leaves* opposite, membranous, ovate or cordate. *Flowers* small, in axillary or lateral racemose cymes with rather long peduncles. *Calyx* 5-partite ; lobes ciliate ; glands in pairs between the lobes. *Corolla* rotate, deeply 5-lobed, the lobes slightly overlapping to the right ; corona-processes erect, membranous, adnate to the base of the staminal-column and shorter than the anthers, truncate bifid trifid or slightly toothed. *Staminal-column* very short, anthers with a round inflexed membranous appendicle ; pollen-masses erect, clavate, attached to the hard pollen-carriers by long slender twisted caudicles. *Ovary* of 2 carpels ; style thick ; style-apex broad, flat, 5-angled with a wavy rim. *Fruit* of 2 (or 1) large, lanceolate, blunt, smooth, follicular mericarps. *Seeds* ovate, margined, ending in a silky coma ; cotyledons flat, elliptic.

COSMOSTIGMA RACEMOSUM, Wt. Contrib. 42 ; F. B. I. iv. 46 ; Wt. Ic. t. 591. *C. acuminatum*, Wt. Ic. t. 1270.

Deccan, in the hills of the Ceded Districts (Wight) ; Carnatic, Kollimalai Hills of Trichinopoly ; W. Gháts, Nilgiris ; Coast of S. Travancore.

A climber with small greenish flowers with brown dots, the leaves acute or acuminate, up to 4 in. long, 3 in. broad.

23. *Oianthus*, Benth.

Twining undershrubs. *Leaves* opposite, usually ribbed from the base. *Flowers* in axillary few-flowered cymes. *Calyx* 5-partite ; lobes small. *Corolla* ovoid-urceolate or disciform, contracted at the mouth ; lobes 5, short, broad, valvate ; corona adnate to the staminal column, cupular, spreading, fleshy, with an inner erect process. *Staminal-column* arising from the base of the corolla, minute, short, depressed ; anthers with short inflexed appendages ; pollen-masses ovoid ascending, attached by very short caudicles to the hard pollen-carriers. *Style-apex* broadly conical, 5-angular, not exerted beyond the anthers.

OIANTHUS BEDDOMEI, Hook. f. Ic. Pl. t. 1466 ; F. B. I. iv. 49.

Wynaad, in the Beigoor forests (Beddome, fig. only).

A twining plant with curious cushion-like much depressed flowers in axillary bracteolate cymes, broadly ovate acuminate subcordate leaves up to 5 in. long, 2.5 in. broad, and pubescent branches and petioles.

24. *Heterostemma*, W. & A.

Twining undershrubs. *Leaves* opposite, with a minute gland near the base on the upper surface, usually 3—5-ribbed from the base. *Flowers* small, in axillary umbellate or racemose cymes, shortly peduncled. *Calyx* 5-partite, minutely glandular within. *Corolla* rotate, the lobes broad, triangular, valvate; corona of 5 spreading lobes, usually with an erect process on the upper side. *Staminal-column* small, depressed; anthers minute, ending in a small membranous appendage; pollen-masses small, compressed, subquadrate or ovoid, attached by very short caudicles to the hard pollen-carriers. *Ovary* of 2 carpels; style-apex sessile, truncate, 5-angled. *Fruit* of 2 slender terete follicular mericarps, often reflexed. *Seeds* ovate, broadly margined, ending in a silky coma.

HETEROSTEMMA TANJORENSE, W. & A. in Wt. Contrib. 42; F. B. I. iv. 47; Wt. Ic. t. 348.

N. Circars, Rampa Hills of Godavari (Ramaswami); Deccan, in Coimbatore (Meebold); S. Carnatic, in sandy places near the sea at Point Calimere in Tanjore (Wight).

A slender twiner, with broadly ovate leaves, obtuse or cordate at base, and up to 4 in. long, 2 in. broad; the linear follicles 4 in. long, reflexed, hooked at apex.

25. *Hoya*, R. Br.

Twining pendulous or rarely erect or rambling and rooting often epiphytic shrubs. *Leaves* opposite, thick and fleshy or coriaceous. *Flowers* in axillary lateral or terminal umbels. *Calyx* small, 5-partite, with 5 glandular scales. *Corolla* rotate, fleshy or waxy; lobes 5, often convex and spreading and reflexed, valvate in bud; corona of 5 fleshy membranous or horny processes adnate to the staminal column, stellately spreading or ascending, often concave on the upper surface, infolded to overlap on the lower, the inner margin usually produced in a spur which is erect or incumbent on the anther. *Staminal-column* usually short, arising from the base of the corolla; anthers conniving over the style apex with a membranous appendage; pollen-masses erect, waxy, usually flattened and sometimes with thickened outer edge, attached by distinct caudicles to the horny pollen-carriers. *Ovary* of 2 distinct carpels; style-apex 5-angled, the tip flattened or slightly apiculate. *Fruit* of 2 or 1 follicular mericarps, usually slender with a thin pericarp, rarely turgid with a thick one. *Seeds* small, ovate or oblong, ending in a long coma; cotyledons thick; radicle cylindric.

Leaves narrow; flowers very few in the umbels, usually 1—3 only:—

Leaves linear gradually dilated from the base to the obcordate tip, .15 in. broad, about 2 in. long, the midrib conspicuous; flower pedicels .5—75 in. long; corolla white, shining, .5—75 in. in diam.; corona processes pink, acutely spurred

1. *retusa*.

Leaves linear-lanceolate, obtuse, 1—2 in. long, .25 in. broad, the midrib strong; flower pedicels .75—1 in. long; corolla white, .75 in. in diam., the margins crispate-pubescent; corona processes purple, the spur recurved.....2. *pauciflora*.

Leaves ovate or elliptic; flowers in many-flowered umbels:—

Corolla glabrous or minutely puberulous within:—

Leaves elliptic or elliptic-lanceolate, abruptly and rather long acuminate at apex, the margins recurved, up to 3.5 in. long, 1.5 in. broad, the main nerves (when dry) nearly horizontal, meeting in an intramarginal looped nerve, pedicels 1 in. long; corona-processes concave above; pollen masses slender, spatulate.....3. *Wightii*.

Leaves elliptic or elliptic-ovate or lanceolate, obtuse or acute at apex, the margins not recurved, up to 4 in. long, 1.5 in. broad, the main nerves (when dry) oblique, inconspicuous, pedicels .5 in. long; corona-processes concave above with raised edges; pollen masses thickened on the outer margins.....4. *ovalifolia*.

Corolla densely silky-villous within; leaves ovate, acute, the margins recurved, up to 2.5 in. long, 1 in. broad, main nerves obscure; pedicels nearly 1 in. long; corona-processes apparently flat above.....5. *pendula*.

1. HOYA RETUSA, Dalz. ; F. B. I. iv. 56.

S. Canara, at Gundiar (Meebold).

A pendulous slender epiphyte.

2. HOYA PAUCIFLORA, Wt. Ic. t. 1269; F. B. I. iv. 56.

W. Ghâts, Sispara in Nilgiris (Lawson), Atapadi Hills of Malabar, at 4,200 ft. (Fischer), hills of Cochin, Tinnevely and Travancore, at 3,000—4,000 ft. (Wight, etc.).

A slender climber, apparently epiphytic and rooting, the foliicles very slender, up to 6 in. long.

3. HOYA WIGHTII, Hook. f. ; F. B. I. iv. 59. *H. pendula*, W. & A. in Wt. Contrib. 36 (excl. syn.).

W. Ghâts, hills of Coimbatore, Nilgiris, Anamalais and hills of Tinnevely, at 4,000—6,000 ft.

A stout climber, apparently epiphytic and rooting, the corolla white or greenish, the corona purple, the foliicles very slender, up to 4 in. long.

4. HOYA OVALIFOLIA, W. & A. in Wt. Contrib. 37; F. B. I. iv. 60; Wt. Ic. t. 847 (not good).

W. Ghâts, from S. Canara southwards, not common.

A glabrous, probably epiphytic, trailer, with pale straw-coloured corolla.

5. HOYA PENDULA, Wt. Ic. t. 474; F. B. I. iv. 61.

N. Circars (*vide* Roxburgh); Nilgiri Hills (Wight).

A slender twining epiphyte with white silky-villous corolla.

Specimens in leaf only received from Mr. A. W. Lushington from the hills of Vizagapatam, 3,500 ft. seem to belong to the N. Indian species *H. longifolia*, Wall. and *H. parasitica*, Wall.

26. Leptadenia, R. Br.

Shrubs, climbing or erect and then with stiff rush-like stems. Leaves opposite, variable, sometimes absent. Flowers small, in umbellate, lateral or axillary, sessile or pedunculate, many-flowered cymes. Calyx 5-lobed to the middle or beyond, eglandular. Corolla deeply 5-lobed, rotate or with a short campanulate tube; lobes 5, valvate in bud, the margins recurved, pubescent or bearded within; corona double, the outer corolline of 5 fleshy processes at the sinuses of the corolla-lobes, the inner staminal of a raised undulate fleshy ring at the base of the staminal column. Staminal-column arising from the base of the corolla;

anthers incumbent on the style-apex with no or minute appendages; pollen-masses suberect or erect, with a pellucid apex, attached by short caudices to the pollen-carriers. Ovary of 2 carpels; style-apex conical, 5-angled, the tip often bifid. Fruit of usually one thick smooth follicle. Seeds small, oblong, winged, ending in a silky coma.

LEPTADENIA RETICULATA, W. & A. in Wt. Contrib. 47; F. B. I. iv. 63; Wt. Ic. t. 350. *L. imberbis*, Wt. Contrib. 48.

N. Circars, Deccan and Carnatic, westward to the E. slopes of the Ghâts, up to about 3,000 ft., chiefly in hedges.

A climbing shrub with pale leaves, yellowish flowers and thick sub-woody follicle with a curved obtuse beak. Bark yellowish-brown, rough, thick; wood white, fibrous. Vern. Mar. Kharkhoda.

27. *Brachystelma*, R. Br.

Erect or twining slender herbs from a tuberous root. Leaves opposite or verticillate, very narrowly linear. Flowers small, in axillary umbelliform sessile or peduncled cymes; pedicels filiform. Calyx 5-partite; lobes linear or lanceolate, glandular within. Corolla campanulate-rotate, deeply 5-lobed, the lobes sometimes adherent at the tips, valvate or slightly overlapping to the right in bud, narrowly linear, glabrous or villous; corona adherent to the staminal tube, annular, shortly lobed or with 5 subulate teeth. Staminal-column very short, anthers erect, not appendiculate; pollen-masses erect, globose-ellipsoid, with a pellucid margin or upper angle, attached by very short caudices to the hard pollen-carriers. Ovary of 2 carpels; style-apex nearly flat. Fruit of 2 very slender smooth follicular mericarps. Seeds ending in a silky coma.

Stem erect:—

Corona shortly toothed without subulate processes; stem short, 6—9 in. long; corolla-lobes linear from a broad base, glabrous, 2—3 in. long; leaves linear, up to 3.5 in. long, .1 in. broad; umbels terminal, sessile or pedunculate with few flowers.....1. *glabrum*.

Corona with 5 subulate processes, undulate or toothed between them:—

Corolla-lobes with purple hairs:—

Corolla-lobes narrowly triangular, 3—5 in. long; corona-processes .1 in.; leaves linear, up to 4 in. long and extremely narrow; cymes sessile or shortly peduncled, 3-flowered.....2. *Bourneae*.

Corolla-lobes linear, 2 in. long, keeled down the middle; corona processes .1—1.5 in. long; leaves almost filiform, 3—4 in. long, .1 in. broad; umbels sessile, 3—5-flowered.....3. *maculatum*.

Corolla-lobes densely white-villous within, linear, 5—7 in. long; corona-processes .1—1.5 in. long; leaves linear, 3 in. long, extremely narrow; umbels 5- or more-flowered.....4. *Rangacharii*.

Stem twining; corona undulately lobed:—

Corolla-lobes not adherent at the tips, linear-lanceolate from a broad base, the margins incurved, white-villous within, 4 in. long; leaves very slender, up to 5 in. long; peduncles short, 3—4-flowered.....5. *volubile*.

Corolla-lobes adherent at the tips, very slender, .75—1 in. long, glabrous, pale without; leaves linear, up to 4 in. long, .25 in. broad; peduncles short, 3-flowered.....6. *brevitubulatum*.

1. BRACHYSTELMA GLABRUM, Hook. f.; F. B. I. iv. 65.

Deccan, hills of the Cuddapah District (Beddome).

A short slender herb, glabrous, the flower small, terminal.

2. *BRACHYSTELMA BOURNEAE*, Gamble in Kew Bull. 1922, 120.
W. Ghâts, Eastern slopes of the Pulney Hills, at low levels (Bourne).
A tall, very slender herb, the corolla greenish-white with dark green spots, the hairs on the lobes and the corona purple, the tubers thick, fusiform.
3. *BRACHYSTELMA MACULATUM*, Hook. f.; F. B. I. iv. 65.
"Canara and Mysore" (Law); Dimbhum in Coimbatore (Rangachari).
A tall slender herb, the corolla-tube spotted, the lobes with stiff purplish hairs, the tubers fusiform.
4. *BRACHYSTELMA RANGACHARII*, Gamble in Kew Bull. 1922, 120.
Deccan, Hassanur in Coimbatore (Rangachari).
A tall, very slender herb, the corolla apparently pale and very white villous within, the tubers oblong.
5. *BRACHYSTELMA VOLUBILE*, Hook. f.; F. B. I. iv. 65.
Deccan, hills of the Cuddapah District, at about 2,000 ft. (Beddome).
A very slender twining herb.
6. *BRACHYSTELMA BREVITUBULATUM*, Gamble n. comb. *Ceropegia brevitubulata*, Bedd. Ic. t. 174. *Brachystelma Beddomei*, Hook. f.; F. B. I. iv. 66.
Deccan, dry rocky hills above Amerdy, Vellore, about 1,000 ft. (Beddome).
A slender twining herb, the corolla-lobes greenish-yellow outside, deep purple within, cohering at their tips, the follicles very slender, 4—5 in. long.

28. *Ceropegia*, Linn.

Perennial herbs, erect or twining; rootstock a tuber or a fascicle of thick fleshy roots. *Leaves* opposite, sometimes minute or 0. *Flowers* usually moderate-sized or large, solitary in pairs or in axillary umbellate or racemose cymes, variously coloured; bracteoles often many. *Calyx* 5-partite, with 5 glandular scales within; lobes narrow. *Corolla* tubular, the tube usually more or less inflated at the base, then elongate, straight or curved, often funnel-shaped, 5-lobed; lobes valvate in bud, more or less connate at their tips; corona double, arising from the staminal column, the outer annular or cupular, entire or 5—10-toothed or of 5 bifid lobes more or less adnate to the inner of 5 short or long processes opposite to the anthers and incumbent on them or erect. *Staminal-column* short, included in the base of the tube; anthers short, erect, without appendages; pollen-masses erect or subhorizontal, waxy, with one pellucid margin, attached to the pollen-carriers by short caudicles. *Ovary* of 2 carpels; style-apex truncate or shortly conical. *Fruit* of 2 lanceolate or linear, sinooth, acuminate follicular mericarps. *Seeds* usually oblong, margined, ending in a silky coma; cotyledons small or large, sometimes smaller than the thick radicle.

Stem erect, from a tuberous root; leaves linear; calyx-lobes very slender:—
Leaves rarely 1—2 in. long, usually less, crowded on a very short stem close

to the ground; flowers solitary, scarcely .75 in. long, the tube of the corolla narrow from an inflated base, the lobes .2 in. long, meeting at the tips; outer corona-lobes bifid, inner linear.....1. *pusilla*.
Leaves usually 2—6 in. long, opposite on a stem 4—9 in. high; flowers solitary 1—1.5 in. long, the corolla-tube subcylindric, not inflated, the lobes about as long as the tube, narrowed downwards and having at the base a ring of purple-tipped hairs; outer corona-lobes bifid, ciliate, inner linear-spathulate

2. *fimbriifera*.

Leaves 4—8 in. long, very narrow, often curved and twisted at tip, opposite on a slender stem up to 1 ft. long; flowers solitary, 1.5—2 in. long, corolla-tube with the base slightly inflated, then cylindric, the slender lobes spirally contorted; outer corona-lobes acute, glabrous, inner filiform.....3. *spiralis*.

Stem twining, from a tuberous or fibrous fleshy root:—

Leaves fleshy, root tuberous:—

Leaves very small or 0, when present sessile, lanceolate, acute, .5—7.5 in. long; flowers in 3—5-flowered umbellate pedunculate cymes, the corolla 1.5—2 in. long, tube with base slightly inflated, then funnel-shaped, lobes about as long as the tube, connate at tip; outer corona-lobes deeply bifid, ciliate, inner linear-spathulate, hooked at tip.....4. *juncea*.
Leaves very variable, linear lanceolate ovate or orbicular, rarely over 1—1.5 in. long or broad; flowers in 3—7-flowered pedunculate cymes, the corolla .5—7.5 in. long, tube with base inflated then cylindric, lobes short; outer corona-lobes minute, inner linear.....5. *bulbosa*.

Leaves membranous:—

Corolla-lobes broad, forming a hemispheric or broadly conical dome over the broadly funnel-shaped mouth of the curved tube:—

Corolla-lobes with long soft ciliae at the mouth, base of tube inflated, globose or oblong and glibbous, length of corolla 1.5—2 in.; outer corona-lobes subulate, nearly as long as the inner processes; leaves ovate or lanceolate, acuminate, up to 4 in. long, 1.5 in. broad.....6. *elagans*.
Corolla-lobes without ciliae at the mouth; outer corona-lobes subulate, shorter than the inner processes:—

Leaves ovate, acuminate, somewhat abruptly, at apex, rounded or cordate at base, up to 2.5 in. long, 2 in. broad; corolla-tube inflated and globose at base, then slender, then broadly funnel-shaped, corolla 1—1.5 in. long in all.....7. *mysorensis*.

Leaves lanceolate, long acuminate at apex, acute at base, up to 3 in. long, 1 in. broad; corolla-tube inflated and oblong at base, then slender, then funnel-shaped, corolla 2—2.5 in. long in all.....8. *Walkeræ*.

Corolla-lobes narrow, shorter than the neck of the tube, forming a conical ovoid or beaked crown over the not much dilated mouth of the tube:—

Leaves and peduncles glabrous:—

Crown in bud long-beaked by the connivent upper parts of the lobes, which are free later; corolla-tube inflated and prominently veined at base, then cylindric, whole length 1—1.5 in.; outer corona-lobes very short, inner processes linear-clavate, connate at tip; leaves variable, ovate orbicular or lanceolate, apiculate, up to 4 in. long, 2 in. broad.....9. *tuberosa*.

Crown in bud very shortly beaked by the connivent tips of the corolla-lobes, afterwards opened in a short dome, the lobes sometimes finally free:—

Corollas about 1 in. long, the flowers erect in umbelliform cymes on pendulous peduncles .75 in. long, the tube inflated below, then cylindric, the lobes ciliate within; outer corona-lobes very small, inner processes spatulate; leaves elliptic-ovate or lanceolate, acuminate, apiculate, up to 4 in. long, 1.5 in. broad.....10. *Candelabrum*.
Corollas about .5 in. long, the flowers in 4—7-flowered axillary cymes on short peduncles, under .5 in. long, the tube slightly inflated below, then funnel-shaped, the crown short; outer corona-lobes minute, inner long, filiform; leaves linear-lanceolate, long-acuminate, 3—4 in. long, .2—3 in. broad, broadest near the base.....11. *acuminata*.

Crown in bud not beaked, the broad lobes arched and connate only by their tips, free later; corollas usually curved:—

Corollas .75—1.25 in. long, tube inflated at base, then narrowly cylindric, then funnel-shaped, the lobes .2 in. long; outer corona-lobes very small and thin, inner processes erect, spatulate; leaves ovate- or elliptic-lanceolate, sometimes linear-lanceolate, acuminate, up to 5 in. long, 2 in. broad.

12. *intermedia*.

Corollas 2—2.5 in. long, tube inflated at base, then narrowed, then funnel-shaped, the lobes about .6 in. long; outer corona-lobes thin, triangular, ciliate, inner processes subulate clavate, slightly longer; leaves elliptic-ovate or lanceolate, acuminate, up to 5 in. long, 2.5 in. broad.

13. *Thwaitesii*.

Leaves and peduncles hispid-pubescent:—

Peduncles 1—5 in. long, stout, hispid, bearing very many-flowered umbelliform often branching cymes, the corolla slender, up to 1 in. long, the base of the tube slightly inflated, the lobes joining in a short oblong head; outer corona-lobes short ciliate, inner processes slender, hooked; leaves linear-ovate or lanceolate, up to 3 in. long, .75 in. broad.....14. *ciliata*.
Peduncles .5—1 in. long, stout, few-flowered; corolla 1—1.5 in. long, tube slightly inflated below, funnel-shaped above, the lobes up to .5 in. long; outer corona-lobes 2-fid, ciliate, inner processes spatulate; leaves from narrowly linear to ovate-lanceolate, acuminate, obtuse or cordate at base, up to 4 in. long, 1.5 in. broad (much longer and narrower in var.)

15. *hirsuta*.

Corolla-lobes about as long as or longer than the neck of the tube:—

Corolla-tube much inflated at base, curved and broadly funnel-shaped upwards, the lobes narrow; corona-lobes short, ciliate, processes erect, linear:—

Leaves oblong-ovate or linear-lanceolate, acuminate, under 1.5 in. broad:—

Inflated base of corolla-tube broad, gradually narrowed into the neck; leaves linear-lanceolate, under 1 in. broad.....16. *Decaisneana*.

Inflated base of corolla-tube broad, suddenly narrowed into the neck; leaves ovate-lanceolate, over 1 in. broad.....17. *brevicollis*.

Leaves ovate or ovate-cordate, acuminate, up to 5 in. long, 2 in. broad; corolla-tube not much inflated, narrowed into the neck, the lobes long and linear.....18. *Stocksii*.

Corolla-tube not or only slightly inflated at base, narrow above and straight:—

Corolla small, pale; flowers in fascicles on an elongate peduncled raceme:—
Corolla .5 in. long or little more, the lobes about as long as the base and neck of the tube; outer corona-lobes short, obtuse, ciliate, inner processes linear, erect; leaves linear, up to 6 in. long, .2 in. broad.

19. *ensifolia*.

Corolla 1 in. long, the lobes about as long as the base and neck of the tube; outer corona-lobes very short, ciliate, inner processes long, spatulate; leaves ovate- or linear-lanceolate, up to 4 in. long, 1 in. broad.

20. *albiflora*.

Corolla dark purple, 3 in. long, slender, the tube slightly inflated at base, then narrowly funnel-shaped, the slender lobes about as long as the whole tube, villous within; outer corona-lobes short, notched, ciliate, inner processes clavate; leaves linear-lanceolate, long acuminate, up to 6 in. long, .5 in. broad.....21. *Beddomei*.

- I. *CEROPEGIA PUSILLA*, W. & A. in Wt. Contrib. 31; F. B. I. iv. 66; Wt. Ic. t. 1261.

W. Ghâts, Nilgiris, on the grassy downs above 7,000 ft.

A minute herb with a depressed tuber about 1 in. in diam. said to be eaten and to be sought for as food by wild pigs. The corollas are pale in colour with purple stripes shading into pink on the tube and lobes. Follicles fusiform, 1.5 in. long.

2. *CEROPEGIA FIMBRIIFERA*, Bedd. Ic. t. 172; F. B. I. iv. 66.
W. Gháts, Anamalais, in rocky grassy places near Tunacadavu at 3,000—4,000 ft. (Beddome).
A slender erect herb with a depressed tuber. The corollas have the tube greenish without, striped with deep purple within, and the lobes pale greenish purple, the fringe deep purple.
3. *CEROPEGIA SPIRALIS*, Wt. Ic. t. 1267; F. B. I. iv. 66.
Deccan, hills of the Cuddapah District, probably at about 2,000—3,000 ft.
A slender erect, or slightly twining herb with a depressed tuber and grass-like leaves. The corollas apparently have the base greenish outside, purplish within, the mouth purple and the twisted lobes also dark-coloured. Follicles very slender about 5 in. long.
4. *CEROPEGIA JUNCEA*, Roxb. Cor. Pl. t. 10; F. B. I. iv. 68; Wt. Contrib. 30.
N. Circars, Deccan and Carnatic and S. Travancore in dry forests.
A fleshy twining plant with branched fibres from the tuberous root, which is edible. The flowers are greenish, speckled and veined with pink and purple, the follicles narrow, up to 5 in. long, long beaked, seeds with the radicle twice as long as the cotyledons. Wight remarks that he has found it growing among the branches of *Euphorbia Tirucalli*. Vern. Tel. Bella gada; Mar. Karvel.
5. *CEROPEGIA BULBOSA*, Roxb. Cor. Pl. t. 7; F. B. I. iv. 67; Wt. Contrib. 32; Wt. Ic. t. 845.
Deccan and Carnatic, in dry localities, and especially near the coast; S. Canara and Malabar.
A fleshy twining herb with a round depressed tuber. The small flowers are greenish, the lobes purple within; the follicles very slender, 3 in. long, the radicle as long as the cotyledons and divided. The leaves and tubers are edible. Vern. Tal. Manchi manda.
Var. *Lushii*, Hook. f. C. *Lushii*, Grah. in Bot. Mag. t. 3300. Leaves very narrowly linear, 2—4 in. long.
Deccan, hills of Cuddapah (Beddome).
6. *CEROPEGIA ELEGANS*, Wall.; F. B. I. iv. 68; Wt. Contrib. 31, Ic. t. 1265, Spic. Nilg. t. 155.
W. Gháts, Nilgiri and Pulney Hills, at 3,000—6,000 ft.
A very pretty slender twiner, the corolla pale blue or green, spotted with purple, the tips of the lobes and the ciliac deep purple; the follicles are very slender, reaching 7—8 in. in length.
7. *CEROPEGIA MYSORENSIS*, Wt. Ic. t. 846; F. B. I. iv. 69.
Deccan, Mysore and Coimbatore, up to 3,000 ft.; hills of Tinnevely.
A slender twiner, the corolla pale green below, bluish above, and spotted with red on the funnel, the tips of the lobes deep purple to nearly black. Follicles very slender, about 6 in. long.
8. *CEROPEGIA WALKERAE*, Wt. Ic. t. 1266; F. B. I. iv. 69.
W. Gháts, in Wynaad, at about 3,000 ft.; Coorg? (Bourne)

opegia.]

- A very slender twiner, the corolla pale blue with some spots, a little like those of *C. elegans* but without the ciliae, and the dome of the corolla less depressed.
9. *CEROPEGIA TUBEROSA*, Roxb. Cor. Pl. t. 9; F. B. I. iv. 70; Wt. Contrib. 32, Ic. t. 353.
N. Circars, Deccan and Carnatic to the lower slopes of the Ghâts, up to about 3,000 ft., common.
A glabrous twiner with tuberous roots giving out fleshy fibrous ones. The corolla is pale green, yellowish inside, purple at the tips of the lobes, and the follicles are very slender, up to 5 in. long, the seeds strongly margined.
10. *CEROPEGIA CANDELABRUM*, Linn.; F. B. I. iv. 70. *C. Elliottii*, Hook. f.; F. B. I. iv. 70.
N. Circars, Simhachelam Hill, Vizagapatam (W. Elliot); W. Ghâts, hills of Coimbatore, Nilgiris, and hills of Travancore W. Coast, S. Canara to Travancore.
A slender climber with corollas apparently green below, the tips purplish, the veins prominent; follicles linear, very slender. Rheede, Hort. Mal. ix. t. 16, a striking picture, shows umbels with all the flowers in bloom at the same time, which is unlikely.
11. *CEROPEGIA ACUMINATA*, Roxb. Cor. Pl. t. 8; F. B. I. iv. 70; Wt. Contrib. 32. *C. discreta*, N. E. Br. in Kew Bull. 1909, 262?
Eastern Coast, cultivated in Madras (Bourne), Coimbatore?
A slender twiner growing from a flattened tuber, the corollas very small, pale, almost white, with purplish tips to the lobes. Follicles curved, 3 in. long, slender. Roxburgh says that all parts are edible. Vern. Tel. Commoo manda.
12. *CEROPEGIA INTERMEDIA*, Wt. Ic. t. 1263; F. B. I. iv. 71.
W. Ghâts, from Wynaad to the Anamalais, Pulneys and hills of Travancore and Tinnevely, at 2,000—3,000 ft.
A slender twiner from a fibrous rootstock, the corollas pale purplish below, the lobes darker, the follicles very slender and straight, 5—6 in. long.
Var. *Wightii*, Hook. f.; leaves linear lanceolate, usually under 5 in. broad, the follicles rather shorter.
Pulney Hills and hills of Tinnevely (Wight, Bourne).
13. *CEROPEGIA THWAITESII*, Hook. Bot. Mag. t. 4758; F. B. I. iv. 71.
W. Ghâts, Pulney Hills and hills of Tinnevely and Travancore, 2,500—7,000 ft.
A rather stout twiner, the corolla pale green with purple blotches on the tube, also a purple band across the lobes and white and green above it. Follicles very long and slender, almost up to 12 in., the tips hooked; the seeds are long, the radicle thick, nearly as long as the oblong cotyledons.
14. *CEROPEGIA CILIATA*, Wt. Ic. t. 1262; Spic. Neilg. t. 154; F. B. I. iv. 72.
W. Ghâts, Nilgiris at 6,000—7,000 ft., common, less so in the Anamalais and hills of Tinnevely.
A slender hispid twiner from a round, rather flattened tuber,

the corolla pale green outside, purplish within, the lobes dark green or lead-coloured; follicles short, slender.

15. *CEROPEGIA HIRSUTA*, W. & A. in Wt. Contrib. 30; F. B. I. iv. 71. *C. vincaefolia*, Hook. Bot. Mag. t. 3740.

N. Circars, in Ganjam (Fischer); Rampa Hills of Godavari (Narayanswami); W. Gháts, Nilgiri Hills (Wight), Anamalais (Beddome).

A hispid climber with tuberous roots, the corolla greenish with small purple spots, the lobes red-purple; calyx lobes long and slender; follicles narrow, 4 in. long. The leaves are very variable, running from broadly ovate to linear (in the var.).

Var. *stenophylla*, Hook. f. Leaves very narrowly linear, up to 6 in. long, 2 in. broad; corolla more purple spotted, the cone of the lobes crowned by pale and purple bands olive-green above; inner corona-processes clavate; tuber rather small, flattened-globose.

W. Gháts, Anamalais and Pulneys at 3,000—5,000 ft.

16. *CEROPEGIA DECAISNEANA*, Wt. Ic. t. 1259, Spic. Neilg. t. 152; F. B. I. iv. 73.

W. Ghats, on the Sispara Ghát, Nilgiris (Wight, Gardner).

A slender climber with tuberous root and narrow leaves, the large corolla much inflated, green with pale purple spots all over, the corona orange, tipped with purple; follicles very slender.

17. *CEROPEGIA BREVICOLLIS*, Hook. f.; F. B. I. iv. 74.

W. Gháts, Anamalai Hills at 2,000—3,000 ft.

A slender climber with irregularly purple-spotted corolla, very short in the neck of the tube; follicles nearly 1 ft. long, very slender.

18. *CEROPEGIA STOCKII*, Hook. f.; F. B. I. iv. 74.

W. Gháts, Wynaad, Anamalais and hills of Travancore at 2,000—4,000 ft., in moist forests.

A rather large climber with corollas green shaded with purple and with purple spots on the funnel part of the tube; follicles very slender, nearly 1 ft. long.

19. *CEROPEGIA ENSIFOLIA*, Bedd. Ic. t. 173; F. B. I. iv. 75.

W. Gháts, Anamalai Hills, in rocky places, 3,000—3,500 ft. (Beddome).

A slender twiner with subglobose tubers, very narrow leaves, greenish-white corollas and slender follicles 6—7 in. long.

20. *CEROPEGIA ALBIFLORA*, Hook. f.; F. B. I. iv. 75.

W. Gháts, hills of Travancore near Peermerd, 3,500 ft. (Beddome).

A slender twiner with long-peduncled inflorescence, white corollas and more or less lanceolate leaves with very oblique nerves.

21. *CEROPEGIA BEDDOMEI*, Hook. f.; F. B. I. iv. 75.

W. Gháts, hills of Travancore, on the Peermerd Ghát, 2,500 ft. (Beddome), hills of Cochin (Johnstone).

A slender twiner with slender flowers, dark purple without, mottled with pale reticulations within the lobes.

29. *Caralluma*, R. Br. (ampl.).

Perennial herbs with angular fleshy stems, usually with many branches. *Leaves* minute, deciduous, on the angles of the stems, often spine-like. *Flowers* in few-flowered fascicles at the upper nodes or in terminal umbels, subsessile or pedicellate. *Calyx* 5-partite; lobes narrow, glabrous. *Corolla* rotate or broadly campanulate; lobes 5, valvate in bud; corona double, the outer annular or cupular, with 5 2-cuspidate lobes, the inner adnate to the outer, elongate and inflexed over the anthers. *Staminal-column* short, arising from the base of the corolla; *anthers* not appendaged; *pollen-masses* erect, suborbicular, compressed, pellucid on the inner margin or at the apex, attached by short slender caudicles to the pollen-carriers. *Ovary* of 2 carpels; style-apex truncate, 5-angled. *Fruit* of 2 linear or linear-lanceolate, smooth, follicular mericarps. *Seeds* oblong, flattened, broadly margined, ending in a silky coma; cotyledons small, much shorter than the large fleshy radicle.

Flowers solitary or in pairs, lateral on elongate branchlets; *corolla-lobes* narrow:—

Corolla-lobes glabrous, without fringes, lanceolate, acute; flower-bearing branchlets very slender, hardened; coma of the seeds white.....1. *adscendens*.

Corolla-lobes fringed with long soft deciduous purple hairs, lanceolate, apiculate, usually folded; flower-bearing branchlets narrow, fleshy; coma often straw-coloured.....2. *attenuata*.

Flowers in terminal umbels; *corolla-lobes* broad:—

Umbels many-flowered:—

Corolla glabrous:—

Corolla within red or purple, streaked within concentrically with many minute red, purple and yellow fine lines.....3. *umbellata*.

Corolla within dark red, not streaked, outside greenish.....4. *campanulata*.

Corolla ciliate on the margin only.....5. *diffusa*.

Corolla with long scattered hairs on the face and margin.....6. *lasiantha*.

Umbels few-flowered, the corolla pale, fringed on the margins.....7. *indica*.

Umbels reduced to a single flower; corolla fringed or villous with purple hairs.....8. *pauciflora*.

1. *CARALLUMA ADSCENDENS*, R. Br.; F. B. I. iv. 76; Wt. Contrib. 33.

Stapelia adscendens, Roxb. Cor. Pl. t. 30.

N. Circars, Deccan and Carnatic, in arid places, among bushes, scarce.

A fleshy herb, sometimes eaten, the corolla yellowish, with dark purple tips to the lobes, the follicles slender, 4—5 in. long. Vern. Tel. Kar allum.

2. *CARALLUMA ATTENUATA*, Wt. Ic. t. 1268; F. B. I. iv. 76. *C. fimbriata*, Hook. f.; F. B. I. iv. 77, not of Wall.

N. Circars, Deccan and Carnatic, up to 2,000 ft. in the hills and on dry slopes of the Gháts, among shrubs, common.

A fleshy herb, said to be edible, the corolla banded white or green and purple on the tube and lower part of the lobes, the upper part dark purple and with purple fringes, the follicles linear-lanceolate, 4—6 in. long.

3. *CARALLUMA UMBELLATA*, Haw. Syn. Pl. Succ. 47. *Boucerosia umbellata*, W. & A. in Wt. Contrib. 34, Ic. t. 495; F. B. I. iv. 77. *Stapelia umbellata*, Roxb. Cor. Pl. t. 241.

N. Circars, Deccan and Carnatic, up to 4,000 ft. in hilly regions, on dry and arid lands, rather common.

An erect branching succulent herb, with large and striking flowers, the foliicles slender, hooked.

4. *CARALLUMA CAMPANULATA*, N. E. Br. in Gard. Chron. 1892, ii. 369; Bot. Mag. t. 7274. *Boucerosia umbellata*, W. & A. var. *campanulata*, Hook. f.; F. B. I. iv. 77. *B. campanulata*, Wt. Ic. t. 1289.

S. Deccan and Carnatic to the E. slopes of the Ghâts, apparently scarce.

An erect branching succulent with striking flowers, impossible to distinguish from the last in dried specimens, but good drawings exist.

5. *CARALLUMA DIFFUSA*, N. E. Br. *Boucerosia diffusa*, Wt. Ic. t. 1599; F. B. I. iv. 78.

Deccan, arid rocky hills in Coimbatore at about 2,000 ft.

A diffuse procumbent fleshy herb with many ascending branches, the corolla dark purplish-brown with many very fine whitish concentric lines, the foliicles slender, nearly 6 in. long.

6. *CARALLUMA LASIANTHA*, N. E. Br. *Boucerosia lasiantha*, Wt. Ic. t. 1286.

Deccan, hills of the Chittoor District (Wight, etc.), dry lands near Gooty.

A many-branched fleshy herb, the corolla very villous.

7. *CARALLUMA INDICA*, N. E. Br. *Hutchinia indica*, W. & A. in Wt. Contrib. 35. *Boucerosia Hutchinia*, DCne; F. B. I. iv. 78.

E. Coast, Nellore (Wight), S. Arcot (Lawson).

A small fleshy herb with many slender stems scarcely 2 in. in diam., acute leaves and pale greenish-white corolla, outwardly tinged with purple and with purplish hairs and fringes.

8. *CARALLUMA PAUCIFLORA*, N. E. Br. *Boucerosia pauciflora*, Wt.; F. B. I. iv. 78.

S. Carnatic, in Tinnevely and S. Travancore.

A small diffuse fleshy herb with slender stems, minute recurved leaves and a pale corolla minutely banded with slender purple concentric lines within, whitish without.

Cryptostegia grandiflora, R. Br., is a stout climbing shrub with large rose-coloured showy flowers, which, a native of tropical Africa, is much grown in gardens and has become more or less naturalised. It gives a fairly good caoutchouc, which is not, however, an article of commerce.

Family CI. LOGANIACEAE.

Trees, erect or climbing shrubs or herbs. *Leaves* opposite, rarely ternate, entire; stipules present or reduced to a transverse line. *Flowers* usually regular, hermaphrodite, in terminal or axillary simple or compound cymes, sometimes solitary. *Calyx* small inferior, lobes 4—5. *Corolla* gamopetalous, 4—5-lobed, the lobes imbricate or valvate. *Stamens* 4—5, inserted on the corolla-tube, alternate with the lobes; anthers 2-celled, introrse. *Ovary* free, usually 2-celled; ovules 1—many in each cell; style simple; stigma capitate or bifid. *Fruit* a septicidal capsule or indehiscent berry. *Seeds* various; albumen fleshy or cartilaginous; embryo straight.

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height. Hill specimens are much more slender than those near the coast.

12. *EXACUM LAWII*, C. B. Clarke; F. B. I. iv. 98.

Bababudan hills of Mysore (Law).

A small erect slender herb with rather large purplish blue flowers.

Small specimens collected by C. E. C. Fischer in the Anamalai Hills at 4,000 ft. seem to belong to *E. pumilum*, Griseb.; F. B. I. iv. 98; Wt. Ic. t. 1324 (3).

2. *Enicostemma*, Blume.

Erect or procumbent branching herbs. *Leaves* opposite, sessile. *Flowers* small, in sessile axillary clusters. *Calyx* deeply 5-lobed. *Corolla*-tube long, tubular below, funnel-shaped above; lobes 5, small, overlapping to the right in bud. *Stamens* 5, inserted at the middle of the corolla-tube; filaments filiform with a small double-hooded scale at the base; anthers erect, acute, included. *Ovary* 1-celled, placentas little intruded; ovules many; style short; stigma capitate. *Fruit* an ellipsoid capsule, septicidally 2-valved, the valves separating. *Seeds* many, subglobose, reticulate.

ENICOSTEMMA LITTORALE, Blume; F. B. I. iv. 101. *Adenema hyssopifolium*, G. Don; Wt. Ic. t. 600.

All plains Districts and to 1,500 ft. in the hills, chiefly however near the sea, often on black cotton soil.

A perennial herb from a thick rootstock, with many erect or procumbent branches, bearing narrow linear or linear-oblong leaves, very variable, 3-ribbed, up to 2·3 in. long and about ½ in. broad. Flowers white, in dense clusters on the stem. An infusion of the plant is used as a tonic like gentian. Vern. Tam. Vellaragu.

3. *Erythraea*, Renealm.

Annual or perennial erect branching herbs. *Leaves* opposite, sessile. *Flowers* pink or white or sometimes yellow, in dichotomous often corymbose cymes. *Calyx* tubular, 4- or 5-lobed, the lobes keeled. *Corolla*-tube long or short, lobes 5, rarely 4, spreading. *Stamens* 5, rarely 4, inserted near the throat of the corolla-tube; filaments short, linear; anthers oblong, often spirally twisted, exserted. *Ovary* 1-celled, the placentas much intruded; ovules many; style linear; stigma 2-lobed. *Fruit* an oblong capsule almost 2-celled, septicidally 2-valved. *Seeds* minute, reticulate.

ERYTHRAEA ROXBURGHII, G. Don; F. B. I. iv. 102; Wt. Ic. t. 1325.

Most plains Districts, in cultivated fields and on grass lands.

An erect herb reaching 8 in. in height, the flowers rose-coloured or white (Wight), the radical leaves spatulate, the stem ones linear, the flowers in good specimens in long-pedicelled dichasia, the capsules often ⅓ in. long.

4. *Gentiana*, Linn.

Annual or perennial herbs, sometimes woody below. *Leaves* opposite, often connate at base. *Flowers* blue, yellow or white, axillary or

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4. *Gentiana*, Linn.

Annual or perennial herbs, sometimes woody below. *Leaves* opposite, often connate at base. *Flowers* blue, yellow or white, axillary or

A small tree, generally epiphytic when young, afterwards up to 30 ft. high, with cream-coloured large flowers, ovoid smoky berry and obovate spatulate obtuse fleshy leaves. Bark grey smooth; wood grey, soft. Vern. *Kan.* Ginnuna; *Mal.* Omal.

5. *Strychnos*, Linn.

Trees or climbing shrubs with usually short clavate circinate tendrils, in some of the axils, the adjacent leaf being then often suppressed. Leaves opposite, usually coriaceous, with 3—5 or more ribs starting from or a little above the base; main nerves transverse joining the midrib and upper side ribs, less conspicuous. Flowers white or yellowish, in terminal or axillary cymes; bracts and bracteoles small. Calyx 5- or 4-lobed. Corolla salver-shaped; tube cylindric; lobes 5 or 4, valvate. Stamens 5 or 4 adnate to the corolla-tube; filaments short; anthers ovate or oblong, cells parallel. Ovary 2-celled, or 1-celled above; ovules many in each cell; style long or short; stigma capitate or obscurely 2-lobed. Fruit a berry, globose, indehiscent, with a hardened pericarp. Seeds many, or 1—2, embedded in a fleshy pulp; globose or compressed, the hilum ventral; albumen horny; embryo short, the cotyledons foliaceous; radicle terete, short.

ANALYSIS AND DESCRIPTIONS AFTER A. W. HILL IN KEW BULL. 1917, 121.

Corolla-tube short, lobes longer than the tube, glabrous or woolly-tomentose on the throat, tendrils bifid, curved and thickened:—

Leaves ovate-lanceolate, acuminate, up to 5 in. long, 2.5 in. broad, glabrous, chartaceous, 3-ribbed from a little above the base, with a slender very faint pair close to the margin, transverse nerves many, sub-parallel, under surface copper-coloured; cymes axillary, about 8 in. long, few-flowered; corolla-lobes with small tufts of hairs within.....1. *aenea*.

Leaves ovate or elliptic-ovate, sometimes orbicular and cordate, cuspidate, shining, coriaceous, up to 2.5 in. long, 1.25 in. broad, minutely pubescent, triple-ribbed, transverse nerves inconspicuous; cymes paniculate, about 1 in. long, the corolla-lobes woolly within.....2. *bicirrhosa*.

Corolla-tube and lobes about equal in length, the throat with woolly tomentum:—
Tree, without tendrils; leaves elliptic, acute, up to 6 in. long, 2.5 in. broad, chartaceous, quintuple-ribbed, the upper pair of ribs 3—7 in. above the lower, transverse nerves about 4 pairs, joining the second pair of ribs to the midrib; cymes about 1 in. in diam. from the top of previous year's wood; ovary and style glabrous.....3. *potatorum*.

Climbing shrubs with bifid thickened tendrils; ovary and style hirsute:—
Leaves ovate-elliptic, acute or acuminate, up to 4 in. long, 2 in. broad, shining, coriaceous, 3-ribbed or sub-triple-ribbed, transverse nerves many, not very distinct; cymes rather over 1 in. long, from old wood.....4. *colubrina*.

Leaves ovate or elliptic-ovate, acute, up to 4 in. long, 2 in. broad, shining subcoriaceous, triple-ribbed, the nerves and reticulation raised; cymes under 1 in. long, in axillary clusters with slender pedicels.....5. *lenticellata*.

Corolla-tube and lobes about equal in length, the lobes with a line of erect hairs within; anthers bearded at the base; ovary and style glabrous; leaves ovate, ovate-lanceolate or narrowly lanceolate, acuminate, up to 5 in. long, 2 in. broad, coriaceous, triple-ribbed, transverse nerves many; cymes axillary, short and dense.....6. *Dalzellii*.

Corolla-tube elongate, much longer than the lobes:—

Tree, without tendrils; leaves broadly ovate or orbicular, obtuse or acute, coriaceous, glabrous, up to 6 in. long, 4 in. broad, 5-ribbed, transverse nerves irregular; cymes terminal, 1—2 in. in diam., many flowered; corolla-tube only slightly hairy near the base within.....7. *Nux-vomica*.

Climbing shrub with single curved, not bifid tendrils; leaves elliptic or ovate.....

abruptly acuminate, shining, coriaceous, glabrous, up to 5 in. long, 2 in. broad, triple-ribbed with a small marginal looped pair, transverse nerves prominent, irregular; cymes terminal, about 1·5 in. broad, many-flowered; corolla-tube long, slightly pilose within.....8. *cinnamomifolia* var. *Wightii*.

1. *STRYCHNOS AENEAE*, A. W. Hill. *S. Rheedii*, Brandis Ind. Trees 474, not of F. B. I.
W. Ghâts, Anamalais and hills of Travancore at 2,000—4,000 ft., in evergreen forest.
A large climbing shrub with prominently reticulate leaves, the fruit said to be spherical, about 2 in. in diam.
2. *STRYCHNOS BICIRRHOSA*, Lesch. *S. colubrina*, C. B. Clarke in F. B. I. iv. 87, in part.
S. Carnatic, in Tanjore (Leschenault).
A climbing shrub with smooth minutely pubescent stems.
3. *STRYCHNOS POTATORUM*, Linn. f.; F. B. I. iv. 90; Roxb. Cor. Pl. t. 5; Wt. Ill. t. 156.
N. Circars, Deccan and Carnatic to S. Travancore, in deciduous forests and up to 4,000 ft. in the hills. The Clearing Nut.
A medium-sized tree which may reach 50 ft. in height. The fruit is a globose 1—2-seeded berry 5—7 in. in diam., and the seeds are used to clear muddy water. Bark brownish-black, corky, deeply cracked; wood white turning yellowish-grey, hard, close-grained and of curious structure, but is little used. Vern. *Hind.* Nirmali; *Ur.* Kotaki; *Tel.* Chilla; *Tam.* Tattan Kottei.
4. *STRYCHNOS COLUBRINA*, Linn.; F. B. I. iv. 87 in part only. *S. Beddomei*, C. B. Clarke; F. B. I. iv. 88 in part.
Carnatic, Veligonda hills of Nellore (Ramaswami); W. Coast, S. Canara to Travancore, to the lower forests of the W. Ghâts.
A large climbing shrub with smooth bark and 1—3 seeded, berry 7 in. in diam. with crustaceous pericarp.
5. *STRYCHNOS LENTICELLATA*, A. W. Hill.
E. Deccan and Carnatic to S. Travancore, in hilly country and deciduous forest.
A climbing shrub with lenticellate stems, the crustaceous berry 75 in. in diam. with 1—2 orbicular flattened seeds. Vern. *Tam.* Cheru mulagu.
6. *STRYCHNOS DALZELLII*, C. B. Clarke; F. B. I. iv. 87.
Bababudan Hills of Mysore (Law).
A large climber with ovate leaves, the crustaceous berry 6 in. in diam. with several discoid seeds.
Var. *lanceolaris*, A. W. Hill, leaves narrowly lanceolate, scarcely 1 in. broad. Coorg and Wynaad (Beddome).
7. *STRYCHNOS NUX-VOMICA*, Linn.; F. B. I. iv. 90; Roxb. Cor. Pl. t. 4; Bedd. Fl. t. 243.
N. Circars, Deccan and Carnatic, also W. Coast, in deciduous forest and up to 4,000 ft. in hilly country; common on laterite and in sandy coast forests as at Strihari Kota. The Nux vomica or Strychnine tree.
A moderate-sized or large deciduous tree with greenish-white flowers having the scent of fenugreek and orange-red berries

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up to 2 in. in diam. with 3—4 flat seeds. These seeds contain strychnine and are collected and exported largely. Bark thin, dark-grey or yellowish-grey; wood white, turning yellowish-grey, hard, close-grained and of curious structure, used for various purposes. Vern. *Hind.* Kuchila; *Ur.* Kachila; *Tel.* Mushti; *Tam.* Yetti; *Mal.* Kanjerám.

STRYCHNOS CINNAMOMIFOLIA, Thw.; F. B. I. iv. 89 in part. Var. *Wightii*, A. W. Hill. *S. Bourdillonii*, Brandis Ind. Trees 474.

Deccan, forests of Kurnool and Mysore; W. Gháts, S. Canara to Travancore in evergreen forests, up to 3,000 ft.

A very large climbing shrub with simple tendrils, the berry very large, 4 in. in diam. (*Bourdillon*), the seeds ovoid, flattened, 1 in. long. The seeds give an alkaloid, chiefly brucine.

8. *Gardneria*, Wall.

Large climbing shrubs, glabrous. *Leaves* opposite, entire, the petioles connected by a stipular line. *Flowers* in axillary pedunculate cymes; bracts in pairs, bracteoles on the pedicels. *Calyx* small, deeply 4—5-lobed. *Corolla* rotate, lobes 4—5, thick, valvate in bud. *Stamens* 4—5, inserted on the corolla-tube; filaments very short; anthers oblong, subconnate, erect, the cells longitudinal. *Ovary* 2-celled; ovules 1 in each cell; style subulate; stigma shortly 2-lobed. *Fruit* a globose 2-seeded berry, the pericarp fleshy. *Seed* hemispheric, cup-shaped, with a deep inner cavity filled with the pulpy placenta; testa coriaceous; albumen fleshy; embryo small, the cotyledons flat; radicle inferior.

GARDNERIA OVATA, Wall.; F. B. I. iv. 93. *G. Wallichii*, Wt. Ic. t. 1313.

W. Gháts, Nilgiris, Anamalais, Pulneys and hills of Travancore at 4,000—7,000 ft.; hills of Mysore.

A large climber with spirally twisting stem, the leaves elliptic acute, up to 3 in. long, the yellow flowers in trichotomous cymes of about 1—5, the berry scarlet. Bark dark brown, wood in wedges of porous tissue, radiating from the centre.

Family CII. GENTIANACEAE.

Herbs, usually glabrous and bitter, rarely shrubs. *Leaves* opposite, rarely alternate, entire, exstipulate. *Flowers* usually regular and hermaphrodite, in terminal cymes or clusters, or axillary and clustered or solitary, rarely bracteate. *Calyx* inferior, 4—7-lobed or partite, the lobes usually imbricate in bud. *Corolla*-tube campanulate, funnel-shaped or cylindric; lobes 4—7, twisted to the right or (in *Limnanthemum*) induplicate-valvate. *Stamens* as many as the corolla-lobes and alternate with them, inserted in the corolla-tube or at its mouth; filaments linear, sometimes dilated below; anthers dehiscing longitudinally, sometimes by apical pores. *Disk* annular, or of 5 glands or none. *Ovary* of 2 carpels, 1—2-celled; ovules usually numerous; style simple; stigma entire or 2-lobed. *Fruit* a membranous capsule, septicidally

2-valved, rarely a fleshy berry. *Seeds* many, small, sometimes winged, testa membranous or crustaceous; albumen copious; embryo small.

Terrestrial herbs; leaves opposite; corolla-lobes contorted in bud:—

Ovary 2-celled; style filiform; flowers blue purple or white.....1. *Exacum*.

Ovary 1-celled:—

Corolla-lobes without pits, depressions or spurs at the base:—

Corolla regular:—

Style linear:—

Flowers white, in sessile axillary clusters.....2. *Enicostemma*.

Flowers pink or white, in dichotomous cymes.....3. *Erythraea*.

Style short or none, flowers usually blue.....4. *Gentiana*.

Corolla irregular:—

Flowers yellow; stigma subentire.....5. *Hoppea*.

Flowers pink or white; stigma deeply 2-lobed.....6. *Canscora*.

Corolla-lobes with pits depressions or spurs at the base:—

Corolla-lobes with 1—2 glandular nectaries near the base.....7. *Swertia*.

Corolla-lobes with pits prolonged behind into spurs.....8. *Halenia*.

Aquatic herbs; leaves alternate; corolla-lobes induplicate-valvate in bud

9. *Limnanthemum*.

1. *Exacum*, Linn.

Herbs, sometimes subshrubby and much branched. *Leaves* opposite, entire, usually 3- or more-ribbed. *Flowers* in terminal and axillary usually leafy dichasioid cymes. *Calyx* deeply 4—5-lobed, the lobes keeled winged or flat on the back. *Corolla* rotate, usually blue purple or white; tube short, globose; lobes 4—5, overlapping to the right in bud. *Stamens* 4—5, inserted on the throat of the corolla; filaments short, anthers usually oblong, dehiscing by terminal pores at length extended downwards. *Ovary* 2-celled; ovules many in each cell on large fleshy placentas adnate to the septum; style long; stigma small, subcapitate. *Fruit* a globose septicidally 2-valved capsule. *Seeds* many, minute, subcuboid, the testa granular.

Corolla large, lobes at least .25 in. long:—

Flowers tetramerous; stems 4-angled, often slightly winged:—

Corolla-lobes .75—1.5 in. long; calyx lobes ovate, gradually acuminate, with a narrow dorsal wing; anthers .4 in. long, straight; leaves ovate, acute, 5- or 7-ribbed, up to 5 in. long, 1.5 in. broad; bracts broadly ovate, acute

1. *Perrottetii*.

Corolla-lobes .75—1 in. long; calyx-lobes ovate, abruptly cuspidate acuminate with a broad rounded dorsal wing; anthers nearly .5 in. long, curved; leaves ovate or oblong-lanceolate, acuminate, 5-ribbed, up to 5 in. long, 2 in. broad; bracts narrowly lanceolate acuminate.....2. *bicolor*.

Corolla-lobes .75 in. long; calyx-lobes ovate-lanceolate, long and setaceous-acuminate with a narrow dorsal wing; anthers .3 in. long, straight; leaves lanceolate acuminate, 5-ribbed, up to 4 in. long, .75 in. broad; bracts narrowly lanceolate.....3. *tetragonum*.

Flowers pentamerous:—

Stems 4-winged or 4-angled, the wings sometimes nearly obsolete towards the base:—

Tall sub-shrubby herb; cymes spreading, the pedicels recurved especially in fruit; corolla-lobes .75 in. long, apiculate; calyx-lobes lanceolate, setaceous-acuminate, with a broad rounded dorsal wing; anthers .2—3 in. long, not attenuate, with a round gland at the top of the connective behind; leaves membranous, ovate-lanceolate, acuminate, 3- or 5-ribbed, up to 4 in. long 1.25 in. broad; bracts linear-lanceolate.....4. *Wightianu*

Low bushy perennial much-branched herbs; leaves small, fleshy, margins, 3-ribbed; pedicels erect; anthers not glandular at the back:—

Flowers about 3, corymbose at the ends of leafy branches, pedicels .4—6 in. long; calyx-lobes narrowly lanceolate, .4 in. long, the dorsal wing attenuate at base; corolla-lobes obovate, .35 in. long; leaves lanceolate acuminate up to 3 in. long, .5 in. broad, the tips often recurved

5. *courtaillense*.

Flowers solitary near the top of leafy branches, pedicels 1—2 in. long; calyx-lobes lanceolate, .4 in. long, the dorsal wing semicordate at base; corolla-lobes obovate, .5 in. long; leaves spatulate, incurved and plicate, very close, up to .75 in. long, .2 in. broad, the tips reflexed, the side ribs very obscure.....6. *travancoricum*.

Flowers solitary in the upper leafy axils, the peduncles bracteolate; corolla-lobes elliptic-obovate, apiculate, .7 in. long; calyx-lobes acuminate semicordate at base, strongly nerved; leaves ovate or suborbicular, acute, rounded or cordate at base, sessile and stem-clasping, up to 2.5 in. long, 2 in. broad, the margin slightly thickened, 3-ribbed.....7. *atropurpureum*.

Stems terete, only the upper parts slightly angled; calyx-lobes narrowly winged, the wings sometimes only a thickened ridge; leaves thickly coriaceous, broadly ovate, acute, sessile and stem-clasping, the margins thickened, up to 2.5 in. long, 1.5 in. broad, 5-ribbed; flowers large, in terminal leafy and bracteate corymbs; corolla-lobes obovate, narrowed below, apiculate, 1 in. long

8. *anamallayanum*.

Corolla small, lobes less than .3 in. long; flowers tetramerous; stems 4-angled:—

Calyx-lobes with a dorsal wing:—

Dorsal wing of the calyx-lobes narrow; pedicels short, under .5 in. long; corolla-lobes elliptic, acute, up to .3 in. long; anthers .15 in. long; leaves subsessile, elliptic or lanceolate, up to 2.5 in. long, .5 in. broad, usually 3-ribbed

9. *pedunculatum*.

Dorsal wing of the calyx-lobes broad, prominently nerved, cordate at base; pedicels long, the middle one often 1—2 in.; corolla-lobes lanceolate, .2—2.5 in. long; anthers .1 in. long; leaves petioled, ovate, acute, up to 2.5 in. long, 1 in. broad, usually 5-ribbed.....10. *petiolare*.

Calyx-lobes without a dorsal wing; anthers under .1 in. long:—

Flowers subsessile; calyx-lobes ovate, indistinctly 3-nerved; corolla-lobes ovate, .3 in. long; leaves small, sessile, obscurely 3-ribbed, up to .25 in. long

11. *sessile*.

Flowers peduncled, the peduncles up to 2 in. long; calyx-lobes ovate, strongly nerved; corolla-lobes elliptic, up to .3 in. long; leaves orbicular-ovate, up to .25 in. in diam.....12. *Lowii*.

1. *EXACUM PERROTETII*, Griseb.; F. B. I. iv. 95; Wt. Ic. t. 1322.

N. Circars, Mahendragiri Hill in Ganjam 4,000—5,000 ft. (Fischer and Gage); Deccan, hills of Mysore; Carnatic, Shevaroy Hills of Salem at 4,500 ft. (Beddome); W. Ghâts, Nilgiris, chiefly about Coonoor and Kotagiri, at 6,000 ft., in grass.

An erect herb, reaching 2 ft. high, sometimes more, the flowers rose-coloured or blue, very handsome.

2. *EXACUM NICOLOR*, Roxb.; F. B. I. iv. 96; Wt. Ic. t. 1321.

N. Circars, Sukmamri Hill in Godavari, 3,000 ft. (Gamble); Deccan, in Mysore and Coimbatore, in hilly country; W. Ghâts, most Districts, at 4,000—6,000 ft., in grassy pastures.

An erect herb, about 2 ft. high, the corolla-lobes generally white in the lower, bright blue in the upper half. The size of the leaves is variable according to locality and soil.

3. *EXACUM TETRAGONUM*, Roxb.; F. B. I. iv. 95.

N. Circars, Rampa Hills of Godavari (V. Narayanswami). An erect herb about 2 ft. high with azure blue flowers.

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Low bushy perennial much-branched herbs; leaves small, fleshy, margins, 3-ribbed; pedicels erect; anthers not glandular at the back:—

Flowers about 3, corymbose at the ends of leafy branches, pedicels .4—6 in. long; calyx-lobes narrowly lanceolate, .4 in. long, the dorsal wing attenuate at base; corolla-lobes obovate, .35 in. long; leaves lanceolate acuminate up to 3 in. long, .5 in. broad, the tips often recurved

5. *courtailense*.

Flowers solitary near the top of leafy branches, pedicels 1—2 in. long; calyx-lobes lanceolate, .4 in. long, the dorsal wing semicordate at base; corolla-lobes obovate, .5 in. long; leaves spatulate, incurved and plicate, very close, up to .75 in. long, .2 in. broad, the tips reflexed, the side ribs very obscure.....6. *travancoricum*.

Flowers solitary in the upper leafy axils, the peduncles bracteolate; corolla-lobes elliptic-obovate, apiculate, .7 in. long; calyx-lobes acuminate semicordate at base, strongly nerved; leaves ovate or suborbicular, acute, rounded or cordate at base, sessile and stem-clasping, up to 2.5 in. long, 2 in. broad, the margin slightly thickened, 3-ribbed.....7. *atropurpureum*.

Stems terete, only the upper parts slightly angled; calyx-lobes narrowly winged, the wings sometimes only a thickened ridge; leaves thickly coriaceous, broadly ovate, acute, sessile and stem-clasping, the margins thickened, up to 2.5 in. long, 1.5 in. broad, 5-ribbed; flowers large, in terminal leafy and bracteate corymbs; corolla-lobes obovate, narrowed below, apiculate, 1 in. long

8. *anamallayanum*.

Corolla small, lobes less than .3 in. long; flowers tetramerous; stems 4-angled:—

Calyx-lobes with a dorsal wing:—

Dorsal wing of the calyx-lobes narrow; pedicels short, under .5 in. long; corolla-lobes elliptic, acute, up to .3 in. long; anthers .15 in. long; leaves subsessile, elliptic or lanceolate, up to 2.5 in. long, .5 in. broad, usually 3-ribbed

9. *pedunculatum*.

Dorsal wing of the calyx-lobes broad, prominently nerved, cordate at base; pedicels long, the middle one often 1—2 in.; corolla-lobes lanceolate, .2—2.5 in. long; anthers .1 in. long; leaves petioled, ovate, acute, up to 2.5 in. long, 1 in. broad, usually 5-ribbed.....10. *petiolare*.

Calyx-lobes without a dorsal wing; anthers under .1 in. long:—

Flowers subsessile; calyx-lobes ovate, indistinctly 3-nerved; corolla-lobes ovate, .3 in. long; leaves small, sessile, obscurely 3-ribbed, up to .25 in. long

11. *sessile*.

Flowers peduncled, the peduncles up to 2 in. long; calyx-lobes ovate, strongly nerved; corolla-lobes elliptic, up to .3 in. long; leaves orbicular-ovate, up to .25 in. in diam.....12. *Lawii*.

1. *EXACUM PERROTETII*, Griseb.; F. B. I. iv. 95; Wt. Ic. t. 1322.

N. Circars, Mahendragiri Hill in Ganjam 4,000—5,000 ft. (Fischer and Gage); Deccan, hills of Mysore; Carnatic, Shevaroy Hills of Salem at 4,500 ft. (Beddome); W. Ghâts, Nilgiris, chiefly about Coonoor and Kotagiri, at 6,000 ft., in grass.

An erect herb, reaching 2 ft. high, sometimes more, the flowers rose-coloured or blue, very handsome.

2. *EXACUM BICOLOR*, Roxb.; F. B. I. iv. 96; Wt. Ic. t. 1321.

N. Circars, Sukmamri Hill in Godavari, 3,000 ft. (Gamble); Deccan, in Mysore and Coimbatore, in hilly country; W. Ghâts, most Districts, at 4,000—6,000 ft., in grassy pastures.

An erect herb, about 2 ft. high, the corolla-lobes generally white in the lower, bright blue in the upper half. The size of the leaves is variable according to locality and soil.

3. *EXACUM TETRAGONUM*, Roxb.; F. B. I. iv. 95.

N. Circars, Rampa Hills of Godavari (V. Narayanswami).

An erect herb about 2 ft. high with azure blue flowers.

Low bushy perennial much-branched herbs; leaves small, fleshy, margins, 3-ribbed; pedicels erect; anthers not glandular at the back:—
Flowers about 3, corymbose at the ends of leafy branches, pedicels .4—6 in. long; calyx-lobes narrowly lanceolate, .4 in. long, the dorsal wing attenuate at base; corolla-lobes obovate, .35 in. long; leaves lanceolate acuminate up to 3 in. long, .5 in. broad, the tips often recurved

5. *courtallense*.

Flowers solitary near the top of leafy branches, pedicels 1—2 in. long; calyx-lobes lanceolate, .4 in. long, the dorsal wing semicordate at base; corolla-lobes obovate, .5 in. long; leaves spatulate, incurved and plicate, very close, up to .75 in. long, .2 in. broad, the tips reflexed, the side ribs very obscure

6. *travancoricum*.

Flowers solitary in the upper leafy axils, the peduncles bracteolate; corolla-lobes elliptic-obovate, apiculate, .7 in. long; calyx-lobes acuminate semicordate at base, strongly nerved; leaves ovate or suborbicular, acute, rounded or cordate at base, sessile and stem-clasping, up to 2.5 in. long, 2 in. broad, the margin slightly thickened, 3-ribbed

7. *atropurpureum*.

Stems terete, only the upper parts slightly angled; calyx-lobes narrowly winged, the wings sometimes only a thickened ridge; leaves thickly coriaceous, broadly ovate, acute, sessile and stem-clasping, the margins thickened, up to 2.5 in. long, 1.5 in. broad, 5-ribbed; flowers large, in terminal leafy and bracteate corymbs; corolla-lobes obovate, narrowed below, apiculate, 1 in. long

8. *anamallayanum*.

Corolla small, lobes less than .3 in. long; flowers tetramerous; stems 4-angled:—

Calyx-lobes with a dorsal wing:—

Dorsal wing of the calyx-lobes narrow; pedicels short, under .5 in. long; corolla-lobes elliptic, acute, up to .3 in. long; anthers .15 in. long; leaves subsessile, elliptic or lanceolate, up to 2.5 in. long, .5 in. broad, usually 3-ribbed

9. *pedunculatum*.

Dorsal wing of the calyx-lobes broad, prominently nerved, cordate at base; pedicels long, the middle one often 1—2 in.; corolla-lobes lanceolate, .2—2.5 in. long; anthers .1 in. long; leaves petioled, ovate, acute, up to 2.5 in. long, 1 in. broad, usually 5-ribbed

10. *petiolare*.

Calyx-lobes without a dorsal wing; anthers under .1 in. long:—

Flowers subsessile; calyx-lobes ovate, indistinctly 3-nerved; corolla-lobes ovate, .3 in. long; leaves small, sessile, obscurely 3-ribbed, up to .25 in. long

11. *sessile*.

Flowers peduncled, the peduncles up to 2 in. long; calyx-lobes ovate, strongly nerved; corolla-lobes elliptic, up to .3 in. long; leaves orbicular-ovate, up to .25 in. in diam.

12. *Latuii*.

1. *EXACUM PERROTETII*, Griseb.; F. B. I. iv. 95; Wt. Ic. t. 1322.

N. Circars, Mahendragiri Hill in Ganjam 4,000—5,000 ft. (Fischer and Gage); Deccan, hills of Mysore; Carnatic, Shevaroy Hills of Salem at 4,500 ft. (Beddome); W. Ghâts, Nilgiris, chiefly about Coonoor and Kotagiri, at 6,000 ft., in grass.

An erect herb, reaching 2 ft. high, sometimes more, the flowers rose-coloured or blue, very handsome.

2. *EXACUM BICOLOR*, Roxb.; F. B. I. iv. 96; Wt. Ic. t. 1321.

N. Circars, Sukmamri Hill in Godavari, 3,000 ft. (Gamble); Deccan, in Mysore and Coimbatore, in hilly country; W. Ghâts, most Districts, at 4,000—6,000 ft., in grassy pastures.

An erect herb, about 2 ft. high, the corolla-lobes generally white in the lower, bright blue in the upper half. The size of the leaves is variable according to locality and soil.

3. *EXACUM TETRAGONUM*, Roxb.; F. B. I. iv. 95.

N. Circars, Rampa Hills of Godavari (V. Narayanswami).

An erect herb about 2 ft. high with azure blue flowers.

terminal, usually sessile. *Calyx* tubular, terete or rarely keeled, sometimes spathaceous; lobes 5 or 4. *Corolla* tubular campanulate funnel-shaped or subrotate; lobes 5—4, often with folds between the lobes. *Stamens* 5 or 4, attached at or below the middle of the tube, included; filaments linear, somewhat flattened below; anthers oblong or ovate. *Ovary* 1-celled, placentas slightly intruded; ovules many, style usually short; stigma bilobed. *Fruit* a stalked or sessile, oblong or ellipsoid capsule, dehiscing septicidally. *Seeds* many, small, the testa reticulate.

Stems short; basal leaves in rosette and near above it much larger than the stem leaves, ovate or spatulate, often reaching 1—1.5 in. long, stem leaves gradually smaller, often very small, usually lanceolate, recurved; capsule-stalk not longer than the calyx-lobes, .25 in. long.....1. *pedicellata* var. *Wightii*.
Stems elongate; basal leaves not larger than the stem leaves, often even smaller, usually under .3 in. long, both ovate or obovate; capsule-stalk longer than the calyx-lobes, often .5 in. long.....2. *quadrifaria* var. *zeylanica*.

1. GENTIANA PEDICELLATA, Wall. *G. quadrifaria*, C. B. Clarke; F. B. I. iv. 111 in part.

Var. *Wightii*, Kusnezow Acta Hort. Petrop. xv. 401. *G. pedicellata*, Wt. Ic. t. 1328, Spic. Neilg. t. 164.

W. Gháts, Nilgiris, Anamalai and Pulney Hills and hills of Tinnevely, above 6,000 ft., in pasture lands.

A tufted herb with bright pale blue flowers.

2. GENTIANA QUADRIFARIA, Bl.; F. B. I. iv. 111 in part.

Var. *zeylanica*, Kusnezow Acta Hort. Petrop. xv. 403.

Bababudan Hills of Mysore, about 6,000 ft.

An erect herb, little branching, with blue flowers.

5. *Hopaea*, Willd.

Small, much-branched glabrous herbs. *Leaves* opposite, small, sessile. *Flowers* sessile or short-pedicelled, in 2—3-chotomus cymes, small. *Calyx* campanulate, membranous; lobes 4, lanceolate. *Corolla* tubular; lobes 4, more or less unequal. *Stamens* inserted in the throat of the corolla, 1 perfect, 3 barren or wanting; filament linear, short; anther ovate, with parallel cells. *Ovary* 1-celled, placentas little intruded; style short, stigma 2-lobed. *Fruit* a globose or ellipsoid capsule, septicidally 2-valved. *Seeds* very many, minute, obscurely reticulate.

Stem 4-angled; calyx-lobes scarious with green marginal nerves; corolla shorter than the calyx; capsule globose.....1. *dichotoma*.
Stem 4-winged; calyx-lobes scarious with slender marginal nerves; corolla longer than the calyx; capsule ellipsoid.....2. *fastigiata*.

1. HOPPEA DICHOTOMA, Willd.; F. B. I. iv. 100.

N. Circars and Deccan in grass, as far south as Salem and Chingleput.

A small herb, up to about 6 in. high, with pale yellow flowers.

2. HOPPEA FASTIGIATA, C. B. Clarke; F. B. I. iv. 100.

N. Circars, in Ganjam (Gamble); Deccan, in Mysore; W. Coast from S. Canara to Travancore.

A small herb, up to about 6 in. high, with pale yellow flowers.

6. *Canscora*, Lamk.

Annual dichotomously branched herbs. *Leaves* opposite, sessile, petiolate or perfoliate. *Flowers* pink or white, in lax terminal dichasiod cymes, or axillary or spicate; bracts leafy or subulate, sometimes perfoliate. *Calyx* tubular, 4-toothed; tube terete and striate, keeled or winged. *Corolla*-tube cylindric, usually very thin and membranous; lobes 4, more or less unequal, imbricate and overlapping to the right in bud. *Stamens* 4, inserted on the corolla-tube, 1 or 2 with longer filaments and larger fertile anthers, 3 or 2 with shorter filaments which are usually sterile. *Ovary* 1-celled, placentas slightly intruded; ovules many; style filiform; stigma deeply 2-lobed. *Fruit* a cylindric membranous capsule, septicidally 2-valved. *Seeds* very small, angular, brown, reticulate.

Bracts at the branches of the inflorescence not perfoliate:—

Calyx not winged:—

Stems 4-angled, leaves, lower elliptic petioled, upper ovate-lanceolate, passing gradually into ovate acute, sometimes nearly linear, sessile, membranous bracts at the bifurcations of the inflorescence; pedicels filiform, usually under .5 in. long; calyx-teeth setaceous.....1. *diffusa*.

Stems 4-winged:—

Pedicels slender, at least .5 in. long, angular:—

Pedicels not enlarged below the calyx; lower leaves oblong-lanceolate or elliptic, attenuate at base, upper ovate-lanceolate; panicles many-flowered.....2. *decurrens*.

Pedicels more or less enlarged below the calyx; lower leaves ovate obtuse, upper ovate acute; panicles few-flowered.....3. *pauciflora*.

Pedicels of central flower 0, of others short and winged or 0; stem-wings prominent, continued into the inflorescence; leaves ovate, obtuse or subacute, sessile, up to .75 in. long, .4 in. broad.....4. *sessiliflora*.

Calyx prominently winged, the wings narrow, reticulate; stems narrowly 4-winged, also the pedicels, the wings broader at the top; leaves ovate or lanceolate, acute, sessile, up to 2 in. long, .75 in. broad, prominently 3-nerved.....5. *decussata*.

Bracts at the branches of the inflorescence perfoliate:—

Calyx prominently winged, the wings broad and reticulate; stems 4-winged, the wings of the short pedicels gradually widening to those of the calyx; leaves lanceolate, acute or acuminate, sessile, up to 1.5 in. long, .6 in. broad.....6. *perfoliata*.

Calyx not winged, striate; stems narrowly 4-winged, the pedicels filiform; leaves lanceolate, acute, sessile, up to 1.25 in. long, .5 in. broad.....7. *Wallichii*.

1. *CANSCORA DIFFUSA*, R. Br.; F. B. I. iv. 103. *C. Lawii*, Wt. Ic. t. 1327 (1). *Pladera virgata*, Roxb.; Hook. Bot. Misc. iii. 88, t. 25.

All Forest Districts, in ravines, on wet banks, sides of water-courses, etc., common.

A very pretty slender annual herb with pink flowers and leaf-like bracts to the forks of the branches of the panicle.

2. *CANSCORA DECURRENS*, Dalz.; F. B. I. iv. 103.

N. Circars, hills of Godavari; Deccan, in hilly country, Kurnool to Coimbatore; W. Coast and W. Gháts, at low levels, often in rice-fields.

A slender erect herb with pink or sometimes white flowers.

3. *CANSCORA PAUCIFLORA*, Dalz.; F. B. I. iv. 103.

W. Coast, S. Canara to Travancore, in grassy places (Dalzell).

A slender erect herb, scarcely separable from *C. decurrens*, at any rate in dry specimens.

4. *CANSCTORA SESSILIFLORA*, Roem. & Sch.; F. B. I. iv. 104.
N. Circars and Carnatic, westwards to the foot of the Madura Hills, in moist places.
An erect herb reaching 18 in. in height, but usually much less, the flowers rose-coloured.
5. *CANSCTORA DECUSSATA*, Roem. & Sch.; F. B. I. iv. 104.
All plains Districts and up to 3,000 ft. in the hills.
An erect herb reaching 20 in. in height, the flowers white.
6. *CANSCTORA PERFOLIATA*, Lamk.; F. B. I. iv. 104. *C. grandiflora*, Wt. Ic. t. 1326.
W. Gháts, from S. Canara and Mysore to the Anamalais and the hills of Travancore, up to 3,500 ft., on the western side.
An erect herb reaching 18 in. in height, the flowers rose-coloured.
7. *CANSCTORA WALLICHII*, C. B. Clarke, F. B. I. iv. 105. *C. perfoliata*, Wt. Ic. t. 1327 (2), not of Lamk.
Carnatic, Kambakam Drúg in Chingleput (Bourne); W. Gháts, Nilgiris to Travancore, in grass lands, up to 5,000 ft.
An erect herb reaching 16 in. in height, the flowers rose-coloured.

7. *Swertia*, Linn.

Annual or perennial herbs. *Leaves* usually opposite. *Flowers* blue lurid or white, sometimes with yellow nectaries, in terminal paniced or corymbose cymes. *Calyx* deeply 4—5-partite; tube 0 or very short; lobes linear or lanceolate, sometimes ovate. *Corolla* rotate; lobes 4—5, overlapping and twisted to the right in bud, each lobe (or the tube below it) having near the base 1 or 2 glandular nectaries naked or covered by a thin scale. *Stamens* 4—5 inserted at the base of the corolla, free or slightly joined in a ring; filaments linear, often dilated downwards; *anthers* oblong, versatile. *Ovary* 1-celled, the placenta slightly intruded; ovules many; style short or 0; stigma bilobed. *Fruit* a sessile, ovate or oblong, 2-valved capsule. *Seeds* usually many, small; testa reticulate.

Nectaries 2 near the base of each corolla-lobe; stigma sessile, broad; small herbs under 10 in. in height.....1. *minor*.
Nectary 1 near the base of each corolla-lobe, a pit with or without a covering scale; style short or 0; herbs exceeding 10 in. in height:—

Inflorescence elongate, paniculate:—

Corolla-lobes obtuse, sometimes apiculate, 2—3 in. long, nectary a pit with fimbriate margin covered with a large ciliate scale; style 0; leaves lanceolate or linear-lanceolate, up to about 3 in. long, 5 in. broad

2. *angustifolia* var. *pulchella*.

Corolla-lobes acuminate, 4—5 in. long, nectary a round pit with long-ciliate edges; style very short; leaves elliptic-lanceolate, acuminate, up to 3 in. long, 1 in. broad.....3. *trichotoma*.

Inflorescence corymbose:—

Flower cymules at the ends of the inflorescence branches dense:—

Nectary near the base of the corolla-lobe covered with a fimbriate scale; corolla-lobes elliptic-obovate, usually apiculate, 3—4 in. long; calyx-lobes narrowly lanceolate; leaves elliptic or spatulate or linear-oblong, almost obtuse, up to 1.5 in. long, 5—7.5 in. broad.....4. *corymbosa*.
Nectary not covered with a scale, the margins fringed; corolla-lobes elliptic, obtuse or mucronate only, 2.5 in. long; calyx-lobes ovate; leaves broadly ovate to nearly orbicular, obtuse, up to 1 in. long, 7.5 in. broad...5. *Beddomei*.

Flower cymules at the ends of the inflorescence branches lax; nectary large, ciliate, covered with a fimbriate scale; corolla-lobes obovate, mucronate, 4 in. long; calyx-lobes narrowly lanceolate; leaves deltoid-ovate, up to 2 in. long, 7 in. broad.....6. *Lawii*.

1. *SWERTIA MINOR*, Knobl. Bot. Cent.-Blatt ix. 321. *Pleurogyne?* *minor*, Benth.; F. B. I. iv. 120. *Ophelia minor*, Griseb.; Wt. Ic. t. 1332.
W. Gháts, Nilgiris, above 6,000 ft., in wet places on grass lands. A small erect herb with white or blue flowers, small ovate sessile leaves and flowers in leafy fastigate paniced cymes, the nectaries with usually ciliate scales.
2. *SWERTIA ANGUSTIFOLIA*, Buch.-Ham.; F. B. I. iv. 125.
Var. *pulchella*, Burkill in Journ. As. Soc. Beng. (New Series) ii. 8.
375. *S. pulchella*, Ham.; F. B. I. iv. 125. *S. affinis*, C. B. Clarke; F. B. I. iv. 126. *Ophelia elegans*, Wt. Ic. t. 331.
N. Circars, hills of Ganjam to Godavari, to 4,500 ft. on Mahendragiri; Deccan, hills of Kurnool; W. Gháts, from the Nilgiris southwards, at 2,000—6,000 ft.
An erect herb reaching 3 ft. in height, the flowers white with blue spots. Said to afford a medicinal bitter.
3. *SWERTIA TRICHOTOMA*, Wall.; F. B. I. iv. 126.
W. Gháts, Nilgiris, above 7,000 ft.
A tall leafy herb with pale blue flowers, the corolla- and long calyx-lobes prominently acuminate or caudate, the upper cyme-branches often in umbels.
4. *SWERTIA CORYMBOSA*, Wt.; F. B. I. iv. 126. *Ophelia corymbosa*, Wt. Ic. t. 1329, Spic. Neilg. t. 165.
W. Gháts, hills of Mysore, Coimbatore, Nilgiris and Malabar, above 5,000 ft.
An erect herb reaching about 20 in. in height, with long branches, the flowers white or pale blue with blue nerves. Sometimes the upper pedicels are in umbels.
Var. *Grisebachiana*, C. B. Clarke. *Ophelia Grisebachiana*, Wt. Ic. t. 1330.
W. Gháts, Anamalai and Pulney Hills, above 6,000 ft.
Leaves- linear-oblong, nearly spatulate when young; flowers rather larger and corolla-lobes more acuminate.
5. *SWERTIA BEDDOMEI*, C. B. Clarke; F. B. I. iv. 127.
W. Gháts, S. Canara to Travancore (Beddome); Nilgiris at Sispara 6,700 ft. (Lawson, Gamble).
An erect herb with rather small flowers in a close flat-topped corymb, the leaves distichous, the calyx-lobes ovate, acute.
6. *SWERTIA LAWII*, Burkill. *S. corymbosa* var. *Lawii*, C. B. Clarke; F. B. I. iv. 126.
W. Gháts, Brahmagiri and Bababudan Hills of Mysore, about 4,000 ft.
A tall herb reaching 2—3 ft. high with white flowers with blue nerves.

8. *Halenia*, Borkh.

Erect herbs, annual or perennial. *Leaves* opposite, usually ribbed. *Flowers* in axillary leafy cymes, the end one often umbelliform, the whole making a lax panicle. *Calyx* 4—5-partite, the lobes sometimes with small glands at the base within. *Corolla* campanulate, 4—5-lobed, pitted near the base, within the pits produced in curved spurs which protrude between the calyx-lobes. *Stamens* 4—5, attached near the base of the corolla; filaments linear; anthers ovate. *Ovary* 1-celled; ovules many, attached to the sutures; style slender; stigmas 2, oblong or linear. *Fruit* a capsule, dehiscing septicidally in the upper part. *Seeds* ellipsoid, smooth, albuminous; embryo minute with minute cotyledons.

HALENIA PERROTTETII, Griseb.; F. B. I. iv. 130; Wt. III. t. 157, Ic. t. 1334.

W. Ghâts, Nilgiris and Pulneys, above 6,000 ft., on the margins of sholas and in long grass.

An erect herb reaching 2—3 ft. in height with pale blue (white with purple edges, *Bourne*) flowers and ovate 5-ribbed leaves.

9. *Limnanthemum*, S. P. Gmel.

Aquatic herbs, floating or creeping; stems erect or runner-like or resembling petioles. *Leaves* alternate or subopposite, orbicular elliptic or ovate, deeply cordate, entire or obscurely sinuate. *Flowers* white or yellow, on peduncles clustered at the nodes or on the apparent petioles close below the leaf-blades. *Calyx* 4—7-partite, the lobes oblong or lanceolate. *Corolla* subrotate; tube sometimes glandular opposite the lobes; lobes 4—7, induplicate-valvate in bud, ciliate fimbriate or folded. *Stamens* 4—7, adnate to the corolla-tube; filaments short, anthers, bastate-oblong, versatile. *Ovary* 1-celled; placentas 2, parietal; style short or long; stigma 2-lobed. *Fruit* a globose ovoid or ellipsoid capsule, indehiscent or bursting irregularly. *Seeds* many, discoid, smooth or tuberculate, sometimes winged, albuminous; cotyledons very small, radicle cylindric.

Stems petiole-like with a single floating leaf at the end node and there rooting; leaves orbicular, deeply cordate; flowers white, yellow towards the base within:—

Corolla-lobes entire, with a longitudinal fold down the middle and glands below it on the tube, white; seeds few, rather large with prominent small tubercles

1. *cristatum*.

Corolla-lobes long fimbriate, not folded down the middle, white with yellow centre; seeds very many, small, smooth, or with a few small tubercles

2. *indicum*.

Stems with spatulate-orbicular radical leaves, and petiole-like orbicular cordate, membranous cauline ones, floating, not rooting at the nodes; corolla white, small, with 4—5 fimbriate lobes; seeds minutely tuberculate, lenticular.....3. *parvifolium*.

Stems with several nodes and alternate leaves, all orbicular and deeply cordate; corolla yellow with lobes fimbriate on the margin; seeds puberulous and minutely reticulate, almost spherical.....4. *aurantiacum*.

1. LIMNANTHEMUM CRISTATUM, Griseb.; F. B. I. iv. 131. *Menyanthes cristata*, Roxb. Cor. Pl. t. 105.

All plains Districts, in tanks and ponds and ditches, common.

A rather small plant, the orbicular deeply cordate, often

purplish floating leaves up to 4 in. in diam., the pedicels short, the seeds few only, less than 10, rather large, usually about 7, the tubercles slightly glochidiate.

2. *LIMNANTHEMUM INDICUM*, Thw.; F. B. I. iv. 131.

All plains Districts, in tanks and ponds and ditches, less common.

A large plant, the orbicular floating leaves up to 12 in. in diam., the pedicels long, the seeds usually very many and small.

3. *LIMNANTHEMUM PARVIFOLIUM*, Griseb.; F. B. I. iv. 132.

W. Coast, backwaters at Quilon, Travancore (Wight).

A delicate plant with many radical leaves and very long slender stems with small floating leaves under 1 in. in diam.; seeds not many.

4. *LIMNANTHEMUM AURANTIACUM*, Dalz.; F. B. I. iv. 132.

Deccan, in Mysore (Meebold); W. Coast.

A straggling plant with elongate stems bearing leaves and flowers at intervals; the minutely puberulous seeds are characteristic as well as the yellow flowers.

Family CIII. HYDROPHYLLACEAE.

Annual or perennial herbs, rarely shrubs. *Leaves* radical or alternate, rarely opposite, exstipulate. *Flowers* regular, hermaphrodite, usually in scorpioid cymes, sometimes in spikes or racemes. *Calyx* inferior, 5-partite. *Corolla* 5-lobed, the lobes imbricate, rarely contorted. *Stamens* 5, inserted on the corolla-tube and alternate with its lobes; filaments filiform; anthers ovate-oblong or linear, versatile. *Disk* hypogynous, inconspicuous or 0. *Ovary* superior, 1—2-celled; ovules 2—many in each cell; styles 1 or 2; stigmas capitate. *Fruit* a globose or ovoid, loculicidal or septicidal, 2-valved capsule or dehiscent irregularly. *Seeds* minute, albumen fleshy; embryo minute.

Hydrolea, Linn.

Herbs, rarely undershrubs. *Leaves* alternate, entire. *Flowers* blue, in short terminal racemes or cymes. *Calyx* 5-partite, lobes lanceolate. *Corolla* rotate or campanulate, 5-lobed. *Stamens* 5; filaments filiform, sometimes dilated at base; anthers sagittate. *Ovary* 2-celled, with fleshy placentas adnate to the dissepiment; ovules many; styles 2, distinct; stigmas capitate. *Fruit* a globose or ovoid septicidal capsule. *Seeds* minute, irregularly wrinkled.

HYDROLEA ZEYLANICA, Vahl; F. B. I. iv. 133; Wt. Ic. t. 601.

All plains Districts, in wet places, rice-fields and on the margins of tanks and watercourses, common.

An annual herb, rooting at the nodes, with bright blue flowers and lanceolate leaves, the calyx glandular pubescent, the capsule thin and transparent.

Family CIV. BORAGINACEAE.

Herbs, shrubs or trees, rarely climbers, often hispid or scabrous. *Leaves* alternate, rarely opposite; stipules 0. *Flowers* regular, hermaphrodite or rarely polygamous, usually in scorpioid cymes, sometimes in 3-chotomous panicles, rarely solitary and axillary; bracts leafy, small or 0. *Calyx* inferior, 5—rarely 6—8-lobed, usually persistent and often accrescent in fruit. *Corolla* gamopetalous, usually 5-lobed, often with scales in the throat; lobes imbricate in bud, rarely twisted. *Stamens* as many as the corolla-lobes, alternate with them, on the corolla-tube; anthers ovate oblong or linear, the cells dehiscing introrsely or laterally. *Ovary* superior, 2-celled with 2 ovules in each cell or 4-celled with 1 ovule: style terminal or gynobasic, simple or forked; stigmas capitate or 2-lobed; ovules suberect from the inner angle of each cell. *Fruit* a drupe of dividing into 2—4 nutlets. *Seeds* erect or oblique; testa membranous; albumen fleshy or 0; embryo straight or curved; radicle superior.

Ovary entire or slightly 4-lobed; style terminal:—

Style twice bipartite; calyx with short teeth accrescent in fruit; drupe 1—4-celled; albumen 0; cotyledons plicate longitudinally; trees or shrubs

1. *Cordia*.

Style once forked or styles 2:—

Style usually bipartite; drupe with 2 2-seeded or 4 1-seeded pyrenes; trees or shrubs.....2. *Ehretia*.

Styles 2; drupe of 4 1-seeded pyrenes; prostrate herbs.....3. *Coldenia*.

Style 1, simple; drupe of 4 1-seeded pyrenes; virgate shrub.....4. *Rotula*.

Style depressed-conical at the apex or with a horizontal ring below the stigma:—

Style short, shortly 2-lobed; pyrenes 2 2-seeded; shrubs, often scandent

5. *Tournefortia*.

Style elongated, dilated above, usually in a ring; pyrenes 4 1-seeded; herbs or undershrubs.....6. *Heliotropium*.

Ovary deeply 4-lobed; fruit of usually 4 nutlets, attached to a carpophore:—

Style subterminal; carpophore pyramidal, excavated to hold the nutlets; anthers connivent in a cone, the connectives produced; fruiting calyx enlarged; herbs

7. *Trichodesma*.

Style gynobasic; carpophore conical; nutlets glochidiate:—

Nutlets not or slightly margined, flattened around the carpophore

8. *Cynoglossum*.

Nutlets prominently margined, the margins recurved, conically attached to the carpophore.....9. *Paracaryum*.

1. *Cordia*, Linn.

Trees or shrubs, sometimes subscandent. *Leaves* alternate or subopposite, petioled, entire or toothed. *Flowers* polygamous, ♂ and ♀ in dichotomous corymbose cymes or clusters; bracts 0. *Calyx* tubular or campanulate, accrescent in fruit; teeth short, often irregular or obscure. *Corolla* funnel- or salver-shaped or campanulate, usually white; lobes 4—8, spreading or reflexed, imbricate. *Stamens* as many as the corolla-lobes, adnate to the tube; the filaments often hairy at the base; anthers sagittate or hastate, usually exerted. *Ovary* 4-celled, ovules solitary in each cell; style terminal, simple below, then 2-partite, the branches again bipartite; stigmas capitate or clavate. *Fruit* an ovoid or ellipsoid drupe with viscid pulp, putamen 1—4-celled but only 1 cell usually with a fertile seed. *Seeds* exalbuminous; cotyledons plicate; radicle short.

Flowers white:—

Corolla small, tube hardly as long as the calyx:—

Leaves alternate or occasionally subopposite, usually with at least the basal pair of nerves opposite:—

Filaments villous at the base:—

Margins of the fruiting calyx not recurved:—

Fruiting calyx not ribbed; leaves usually without conspicuous cystoliths on the upper surface, penninerved but the lowest pair usually opposite; ♂ flowers usually larger than ♀; drupe ovoid:—

Leaves not tomentose beneath, sometimes villous, especially in the axils of the nerves, variable in shape but usually ovate to suborbicular, shortly and obtusely acute at apex, obtuse or cuneate at base, often repand-crenate, up to 5 in. in diam., the petiole 1.5 in.; flowers moderate sized in lax cymes, usually shortly peduncled, 1—2 in.

1. *obliqua*.Leaves softly fulvous- or white-tomentose beneath, ovate-orbicular, truncate or cordate at base, obtuse or slightly acute at apex, up to 6 in. in diam., the petiole 2 in.; flowers rather large in lax cymes, usually long-peduncled, up to 4 in. 2. *Wallichii*.

Fruiting calyx ribbed:—

Leaves large, ovate, cordate, obtuse, crenate-dentate, at first smooth above, later very rough and wrinkled with impressed nerves and with prominent cystoliths, densely tomentose beneath with white or tawny wool, up to 6 in. in diam.; flowers rather large, especially the ♂, in rather short terminal or axillary corymbs; drupe ovoid, acute, half enclosed in the ribbed cup-shaped calyx. 3. *Macleodii*.

Leaves small, ovate, subacute at apex, rounded at base, repand, up to 2 in. long, 1 in. broad, when young closely grey-tomentose; flowers in few-flowered small terminal corymbs; drupe ovoid, rostrate-acuminate, .75 in. long, seated on the cup-shaped ribbed calyx

4. *domestica*.

Margin of the fruiting calyx strongly recurved, the calyx ribbed, the drupe large, up to 1 in. long; leaves variable, ovate rhomboid or broadly oblong, obtuse but often abruptly apiculate at apex, cuneate at base, upper surface with white cystoliths, lower fulvous or grey-tomentose, up to 8 in. long, 4 in. broad, the petiole 2 in.; flowers in lax usually subterminal fulvous-tomentose cymes, the ♂ rather larger; the calyx tubular

5. *evolutior*.Filaments glabrous at the base; leaves ovate, obtuse or acute at apex, usually rounded at base, often subopposite, upper surface scabrous with prominent whitish points, lower villous or tomentose, sometimes nearly glabrous, up to 4 in. long, 2 in. broad; flowers in short-peduncled close corymbs, the calyx-tube cylindric; drupe ovoid acute, variable in size. 6. *monovica*.

Leaves usually subopposite, the basal pair of nerves not opposite:—

Leaves oblanceolate-oblong, obtuse, entire or undulate, upper surface dotted with white cystoliths, up to 4 in. long, 1.5 in. broad; flowers small, in lax terminal or axillary pedunculate cymes usually tetrandrous; drupe ovoid, acute, up to .5 in. long. 7. *Rothii*.Leaves elliptic-obovate, obtuse or emarginate, entire or subcrenate, upper surface scabrous hispid; flowers small, in few-flowered subsessile corymbs; drupe ovoid, acuminate, up to .5 in. long. 8. *Perrottetii*.Corolla rather large, the tube longer than the calyx; leaves ovate, acuminate, entire to serrate, the basal pair of nerves opposite, up to 6 in. long, 3 in. broad, without cystoliths, nearly glabrous; flowers in lax long-peduncled terminal corymbs, the calyx-tube cylindric, .3 in. long. 9. *octandra*.Flowers large, orange or orange-scarlet, the corolla-tube longer than the calyx; leaves large, ovate or elliptic, rough. *Sebestena* and *subcordata*.

1. *Cordia obliqua*, Willd.; Hutch. in Kew Bull. 1918, 221; F. B. I. iv. 137, excl. var. *C. Myxa*, Roxb.; F. B. I. iv. 136, not of Linn; Wt. III. t. 169.

All Forest Districts, in deciduous forest, common; sometimes cultivated.

A moderate-sized deciduous tree with white flowers, leaves very variable in size, and a yellow or pink ovoid glossy berry supported by the accrescent calyx and containing a mucilaginous transparent edible pulp. Bark thick, grey or brown; wood greyish-brown, moderately hard, used for various purposes. Vern. *Hind.* Lasora; *Ur.* Gondi; *Tel.* Iriki, Nakkeri; *Tam.* Vidi; *Can.* Challe; *Mal.* Virusham.

2. *CORDIA WALLICHII*, G. Don; Bedd. Fl. t. 245. *C. obliqua*, Willd., var. *Wallichii*, C. B. Clarke; F. B. I. iv. 137. *C. obliqua*, Wt. Ic. t. 1378.

W. Deccan and W. Gháts, in deciduous forests, often with teak. A moderate-sized tree with a useful wood.

3. *CORDIA MACLEODII*, Hook. f. and Th.; F. B. I. iv. 139; Brand. For. Fl. t. 41.

Deccan and Carnatic, in hilly deciduous forest up to 4,000 ft. A deciduous tree reaching 40 ft. in height. Bark thick, grey, corky; wood light brown, mottled, very hard and handsome, useful for furniture and other ornamental work. Vern. *Hind.* Dhengan; *Ur* Baurlo; *Tel.* Pedda barava.

4. *CORDIA DOMESTICA*, Roth. *C. Myxa* var. *domestica*, C. B. Clarke; F. B. I. iv. 137. *C. fulvosa*, Wt. Ic. t. 1380.

Kambakam Hills of Chinglepnt (Herb. Madras 8979). Apparently a shrub or small tree, but well-marked by the small white-pubescent leaves, the narrow corolla-lobes, ribbed calyx and long-pointed fruit.

5. *CORDIA EVOLUTION*, Gamble n. comb. *C. fulvosa*, C. B. Clarke in F. B. I. iv. 140 with var. *evolution*, not of Wt.

Deccan, Marnhalli in Mysore (Meebold); Carnatic, Melpat in S. Arcot (Barber).

A small tree with a low spreading crown, 12—15 ft. high, usually with much fulvous tomentum, and large drupe.

6. *CORDIA MONOICA*, Roxb. Cor. Pl. t. 58; F. B. I. iv. 137.

Deccan and Carnatic, in hilly country chiefly, W. to the E. slopes of the Gháts.

A small tree or shrub with white flowers and a yellow fruit, the leaves variable in shape and amount of tomentum. Vern. *Tel.* Panugeri.

7. *CORDIA ROTHII*, Roem. & Sch.; F. B. I. iv. 138; Wt. Ic. t. 1379.

Deccan and Carnatic, in dry deciduous forests.

A small tree with white flowers and yellow or reddish-brown fruit. Bark grey or brownish-grey, with deep longitudinal furrows; wood hard, brown, streaked, useful for agricultural work and furniture. Vern. *Hind.* Gondi; *Tam.* Narvilli.

8. *CORDIA PERROTTETII*, Wt. Ic. t. 1381; F. B. I. iv. 138.

Deccan, chiefly on black-cotton soil as in Bellary.

A small tree.

9. *CORDIA OCTANDRA*, DC.; F. B. I. iv. 140. *C. serrata*, Roxb.; Wt. Ic. t. 469.

Travancore, in dry forest at about 1,000 ft.

A small tree with usually 8 stamens. Bark pale brown; wood whitish-brown, soft, used for agricultural implements. Vern.

Tam. Potta virasu.

Cordia Sebestena, Linn. is a small tree, occasionally found in cultivation in gardens in the plains; it is a native of the W. Indies. *C. subcordata*, Lamk., is also found in Madras gardens; it is a coast plant of the Andaman Islands and Malay Peninsula, also with large orange-red flowers.

2. *Ehretia*, Linn.

Trees or shrubs. *Leaves* alternate. *Flowers* small, usually white, in terminal or axillary, corymbose or paniced, cymes, rarely solitary. *Calyx* small, 5-partite. *Corolla* with a short cylindric tube; lobes 5, spreading or reflexed, imbricate. *Stamens* 5, inserted on the corolla-tube, usually exserted; filaments filiform; anthers ovate or oblong. *Ovary* 2-celled with 2 ovules in each cell, or 4-celled with 1 ovule; style terminal, bifid or 2-partite or styles 2; stigma small, capitate. *Fruit* a small sub-globose drupe with 4 1-celled or 2 2-celled or 1 4-celled pyrenes, 1 or more of the pyrenes or seeds frequently suppressed. *Seeds* straight, testa thin, albumen scanty; cotyledons oblong, small.

Style single, bifid less than half-way down; calyx-lobes small, oblong ovate or lanceolate, glabrous or pubescent:—

Leaves serrate, elliptic or ovate, acuminate, nearly glabrous, up to 7 in. long, 3 in. broad; flowers in subsessile fascicles on the branches of axillary or terminal panicles; calyx-lobes obtuse; drupe with 2 2-celled pyrenes without cavity

1. *acuminata*.

Leaves entire; drupe with 4 pyrenes or less, the pyrenes with a cavity:—

Leaves usually more than 3 in. long, 2 in. broad:—

Flowers in axillary lateral or terminal lax cymes of unilateral spikes or racemes:—

Leaves unsymmetric, pale when dry, variable in shape, usually elliptic or elliptic-obovate, obtuse or obtusely acute at apex, cuneate at base, with about 7 pairs of strong main nerves, up to 8 in. long, 4.5 in. broad, innovations rusty-pubescent.....2. *laevis*.

Leaves symmetric, dark brown to nearly black when dry, elongate-elliptic, acuminate at apex, attenuate at base, with about 6–8 pairs of strong main nerves, up to 6 in. long, 2–3 in. broad, innovations puberulous

3. *canarensis*.

Flowers in usually terminal, sometimes axillary, hispid-pubescent corymbose cymes; leaves elliptic or ovate, obtuse or subacute, hispid-pubescent beneath, up to 4 in. long, 2 in. broad, main nerves 6–7 pairs, close and regular; drupe rather large.....4. *aspera*.

Leaves usually less than 3 in. long, 2 in. broad; flowers in rather close terminal or axillary corymbs:—

Leaves elliptic or obovate, obtuse at apex but sometimes minutely apiculate, nearly glabrous, up to 2.5 in. long, 1.25 in. broad, the main nerves 4–5 pairs; corymbs lax, the flowers rather large; calyx .1 in. long, lanceolate, nearly or quite glabrous, as long as the corolla-tube.....5. *ovalifolia*.

Leaves elliptic-lanceolate or oblanceolate, acute at apex, long attenuate at base, glabrous, up to 2 in. long, .75 in. broad, main nerves 4–6 pairs, oblique; corymbs mostly terminal and rather dense, the flowers small; calyx about .5 in. long, shorter than the corolla-tube.....6. *Wightiana*.

Leaves ovate, scabrous-pubescent, as are the branchlets and inflorescence, obtuse at apex with a small apiculus, narrowed or rounded at base, up to 2 in. long, 1 in. broad, the main nerves irregular, about 4 pairs; corymbs

small, few-flowered; calyx-lobes lanceolate, scabrous, as long as the corolla-tube.....7. *pubescens*.
 Styles 2 or 1 slender and bifid to near the base; calyx-lobes large, spatulate, with white bristles; leaves fascicled, coriaceous, obovate, cuneate at base, rounded and often 3—5-lobed at apex, densely covered on the upper surface with large white glands each with a bristle, up to 1 in. long, 3 in. broad; corolla campanulate with obtuse spreading lobes; filaments slender; drupe with 1 4—5-celled pyrene.....8. *microphylla*.

1. *EHRETIA ACUMINATA*, R. Br.; F. B. I. iv. 141. *E. serrata*, Roxb.; Wt. Ill. t. 170.
 N. Circars, hills of Vizagapatam, at 3,000—3,500 ft. (A. W. Lushington).
 A moderate-sized tree with white flowers. Bark grey, longitudinally fissured; wood light brown, moderately hard, resembling that of the ash, useful. Vern. *Hind.* Panyan.
2. *EHRETIA LAEVIS*, Roxb. Cor. Pl. t. 55; F. B. I. iv. 141; Brand. For. Fl. t. 42.
 N. Circars and Deccan, in deciduous forests, in the hills to about 2,000 ft., more scarce in the Carnatic.
 A moderate-sized or small deciduous tree with pale grey branches, white flowers in conspicuous cymes often terminal and orange-scarlet fruit turning black. Bark grey; wood greyish-white, even-grained and tough. Vern. *Hind.* Chamror; *Ur.* Mosonea; *Tel.* Paldatam.
3. *EHRETIA CANARENSIS*, Miq. in Pl. Hohenack. No. 285. *E. laevis*, Roxb., var. *canarensis*, C. B. Clarke; F. B. I. iv. 141. *E. laevis*, Wt. Ic. t. 1382; Bedd. Fl. t. 246, *not of* Roxb.
 W. Ghâts, in all Districts, up to about 3,000 ft.
 A small tree with brownish-grey branches and white flowers, in small usually axillary cymes. Wood greyish or brownish-white. Vern. *Mal.* Chavandi.
4. *EHRETIA ASPERA*, Willd. Phyt. 4. t. 2. fig. 1; Roxb. Cor. Pl. t. 55. *E. laevis*, Roxb., var. *aspera*, C. B. Clarke; F. B. I. iv. 142.
 Carnatic, in dry places near Negapatam, west to Coimbatore, north to Vizagapatam.
 A small tree with brown branches and hispid-pubescent leaves and inflorescence. Vern. *Tel.* Tella juvi.
5. *EHRETIA OVALIFOLIA*, Wt. Ic. t. 1383; F. B. I. iv. 143.
 W. Ghâts, E. side, from Coimbatore southwards, at low levels.
 A small branching tree with pale brown branches, white flowers and red drupes.
6. *EHRETIA WIGHTIANA*, Wall.; F. B. I. iv. 143; Wt. Ic. t. 1384.
 W. Ghâts, hills of Tinnevely about Courtallum.
 A shrub with slender pale brown branchlets and white flowers.
7. *EHRETIA PUBESCENS*, Benth. in Royle Ill. 306. *Ehretia laevis*, Roxb., var. *pubescens*, C. B. Clarke; F. B. I. iv. 142.
 Deccan, hills of Cuddapah and Nellore up to 3,000 ft., E. slopes of the Anamalais.
 Apparently a shrub with stout pale brown branchlets.
8. *EHRETIA MICROPHYLLA*, Lamk. *E. buxifolia*, Roxb. Cor. Pl. t. 57; F. B. I. iv. 144.

N. Circars, Deccan and Carnatic, eastwards to the slopes of the W. Gháts, southwards to S. Travancore, common in dry scrub forests.

A small shrub reaching 3—4 ft. high, with fascicled very coriaceous small leaves and a scarlet globose drupe. Vern. Tel. Bupana buri.

3. Coldenia, Linn.

Prostrate scabrid herbs. *Leaves* alternate, small, crisped. *Flowers* white or yellow, axillary, sessile or nearly so, the upper sometimes in a one-sided leafy spike. *Calyx* 4—5-partite; lobes lanceolate or linear. *Corolla-tube* short; lobes 4—5, imbricate in bud. *Stamens* 4—5, on the corolla-tube, included; anthers ovate. *Ovary* 2-celled with 2 ovules in each cell, or imperfectly 4-celled; styles 2, distinct from the base or slightly cohering upwards; stigmas capitate. *Fruit* a nearly dry drupe of 4 subconnate 1-seeded pyrenes. *Seeds* with thin testa; albumen scanty or 0; cotyledons flat.

COLDENIA PROCUMBENS, Linn.; F. B. I. iv. 144.

All plains Districts, on moist ground on the margins of tanks, etc., and in rice-fields, but in the dry season chiefly if not solely. A procumbent herb with trailing stems lying flat on the ground, the young parts very white-silky, the leaves obovate-oblong, crenate, up to 1.5 in. long at the main nodes, much smaller on the branchlets and very shaggy, the nerves impressed deeply; the pyrenes rounded on the back, combined in a sharp-pointed pyramid.

4. Rotula, Lour.

A shrub with virgate branches. *Leaves* small, alternate or fascicled, entire or obscurely toothed. *Flowers* small, few, on short lateral branchlets, between the leaves, sometimes laxly racemose; bracts 2. *Calyx* 5-partite; lobes lanceolate, acuminate, imbricate. *Corolla-tube* short, campanulate; lobes 5, oblong, imbricate in bud. *Stamens* 5, on the corolla-tube; anthers oblong or ovate. *Ovary* ovoid, 2-celled with 2 ovules or 4-celled with 1 ovule in each cell; style filiform, simple; stigma capitate. *Fruit* a drupe with 4 crustaceous 1-seeded pyrenes. *Seeds* oblong; testa membranous; albumen scanty; cotyledons ovate.

ROTULA AQUATICA, Lour.; Robins. in Philipp. J. Sc. iv. 693. *Rhabdia lycioides*, Mart.; F. B. I. iv. 145. *Ehretia cuneata*, Wt. Ic. t. 1385.

Most Districts, on the banks and rocks on the margins of rivers and streams, often where occasionally submerged in floods.

A small branching shrub, often villous, the branches rooting, the leaves small and narrow, spatulate, up to 1 in. long, often tomentose beneath, the flowers purple, the fruit red or orange.

5. Tournefortia, Linn.

Trees or shrubs, often climbing more or less. *Leaves* alternate, entire. *Flowers* numerous, in terminal, rarely lateral or extra-axillary, dichotomous scorpioid cymes, white or greenish-yellow. *Calyx* of 5

ovate or lanceolate sepals. *Corolla*-tube usually cylindric; lobes 4 or 5, short, spreading. *Stamens* 4 or 5, included in the corolla-tube; filaments short; anthers oblong. *Ovary* 4-celled, ovule 1 in each cell, pendulous; style terminal, short and ending in a shortly 2-lobed stigma. *Fruit* a small ovoid scarcely fleshy drupe, separating into 2 or 4 pyrenes. *Seed* straight or curved, albuminous; testa thin; cotyledons oblong.

Leaves oblong-lanceolate, long-acuminate, the nerves oblique:—

Leaves cuneate or unequal at base, under surface green, dark brown when dry, up to about 6 in. long, 1.5 in. broad, main nerves about 7 pairs.....1. *Heyneana*.
Leaves usually rounded at base, under surface pale, with brownish-purple reticulation, up to 6 in. long, 2 in. broad, main nerves about 8 pairs.....2. *reticosa*.
Leaves ovate or ovate-oblong, shortly acuminate, subcordate at base, the under-surface dark brown, up to about 6 in. long, 2.5 in. broad.....3. *Wightii*.

1. *TOURNEFORTIA HEYNEANA*, Wall.; F. B. I. iv. 145.
W. Ghâts, Nilgiri and Anamalai Hills, about 3,000 ft.
A subscent shrub with the flowers uniserial on the cyme-branches, the corolla-tube .3 in. long.
2. *TOURNEFORTIA RETICOSA*, Wt. Ic. t. 1386; F. B. I. iv. 146.
W. Ghâts, Coorg, Wynaad and hills of Travancore at 3,000—4,500 ft.
A subscent shrub similar to the last but the leaves more prominently reticulately nerved beneath, the drupes ovoid with 2 pyrenes, each with 2 seeds.
3. *TOURNEFORTIA WIGHTII*, C. B. Clarke; F. B. I. iv. 146.
W. Ghâts, Anamalai Hills, at 4,500 ft.
A subscent shrub similar to the others but more pubescent and with broader leaves having less oblique nerves.

6. *Heliotropium*, Linn.

Annual or perennial herbs or undershrubs, usually villous or scabrous. *Leaves* alternate. *Flowers* small, white or pale purple, in usually terminal dichotomous cymes, the branches often in long spikes or racemes and scorpioid; bracts small or 0, sometimes leafy with the cymes axillary. *Calyx* 5-lobed; lobes lanceolate or linear. *Corolla*-tube cylindric; lobes 5, imbricate or induplicate, usually spreading in flower. *Stamens* 5, on the corolla-tube, included; filaments short; anthers ovate or lanceolate, sometimes connected by the tips of the apiculate connectives. *Ovary* completely or imperfectly 4-celled; ovules solitary in each cell; style terminal, short or rather long, ending in a flat or conical disk surmounted by the entire or rarely bifid short stigma. *Fruit* dry, indehiscent, 2- or 4-lobed, at length splitting into 4 usually distinct nutlets. *Seeds* straight or curved; albumen usually scanty; cotyledons plano-convex, radicle short.

Lobes of the corolla cordate-acuminate; anthers with the produced connective bifid or trifid at apex; stigma elongate, white-penicillate at apex; leaves lanceolate, 1—2 in. long, 2—5 in. broad, with stiff hairs from bulbous bases; nutlets margined, rounded and tuberculate on the back.....1. *subulatum*.
Lobes of the corolla broad, very shortly pointed, plicate in bud and usually incurved:—

Calyx in fruit closely enveloping the nutlets, very woolly; anthers lanceolate, near the top of the tube; stigma conical or cylindric with penicillate apex;

leaves elliptic or ovate, obtuse, softly white-woolly, up to 1 in. long, the nerves impressed; nutlets usually margined, rounded and tuberculate on the back

2. *supinum*.

Calyx in fruit not closely enveloping the nutlets, usually with narrow lobes:—

Stamens separate, usually acuminate:—

Nutlets all separating; stigma sessile or nearly so:—

Leaves obovate-spathulate, obtuse, densely softly white-silky, .5—1.5 in. long, .3—5 in. broad, petioled; stigma elongate conical, minutely pubescent; nutlets densely pubescent, acute at apex.....3. *ovalifolium*.

Leaves linear or linear-spathulate or lanceolate, glabrous, fleshy, up to 1.5 in. long; stigma conical, apex bifid; nutlets glabrous, smooth on the back, the margins corky.....4. *curassavicum*.

Nutlets combined in pairs, separating later, beaked angled and with an empty cavity; stigma obtuse, above the lobed ring; leaves ovate, obtuse, narrowed or cordate at base, often unequal, undulate, usually decurrent on the long petiole, up to 4 in. long, 3—4 in. broad, hispid-pubescent.....5. *indicum*.

Stamens joined together by their tips, afterwards separating and apiculate; stigma conical above the umbrella-shaped ring, stalked by the style:—

Flowers in elongate racemes; erect herbs:—

Bracts small, linear; leaves linear or narrowly oblong, up to 1 in. long, .1 in. broad; stems nearly glabrous; nutlets globose, sparingly hirsute.....6. *zeylanicum*.

Bracts rather large, lanceolate, veined; leaves linear-lanceolate, up to 1.5 in. long, .25 in. broad, softly strigose-hirsute; stems also softly hirsute; nutlets globose, glabrous except near the apex.....7. *bracteatum*.

Flowers in spikes or racemes, bracteate; much-branched, low, sometimes procumbent undershrubs:—

Bracts inconspicuous; branches and leaves very white-strigose hispid; flower-spikes up to 3 in. long; leaves narrowly oblong-lanceolate, up to .6 in. long, the margins reflexed; nutlets ovoid, with minute grey hairs.....8. *brevifolium*.

Bracts conspicuous:—

Branches stout, divaricating, covered with white appressed strigose hairs; leaves linear-oblong, also white-strigose, the margins reflexed, up to .6 in. long, .15 in. broad; flower-spikes 1—2 in. long, the bracts ovate; nutlets depressed, densely white strigose-hirsute.....9. *Rottleri*.

Branches twiggy, radiating from the rootstock, procumbent or slightly ascending, appressed hirsute; leaves ovate lanceolate or linear-lanceolate, strigosely hirsute, the margins flat, .25—75 in. long; flower-spikes very short but sometimes up to 1 in. long; nutlets subglobose, bristly, usually depressed.....10. *scabrum*.

1. *HELIOTROPIUM SUBULATUM*, Hochst.; Duthie Fl. Gang. Pl. ii. 91. *H. zeylanicum*, C. B. Clarke; F. B. I. iv. 148, *not of* Lamk.; Wt. Ic. t. 892. *Tournefortia zeylanica*, Wt. Ill. t. 170.

Deccan and Carnatic, often on black cotton soil.

An erect scabrous hispid annual with flowers in long usually unilateral spikes.

2. *HELIOTROPIUM SUPINUM*, Linn.; F. B. I. iv. 149; Wt. Ic. t. 1387.

Deccan and Carnatic, often on black cotton soil, also on dry rice-fields and other cultivated lands.

A prostrate softly white villous annual herb, the very small flowers in short one-sided simple or branched woolly spikes. The branches are sometimes ascending (var. *malabarica*, C. B. Clarke).

3. *HELIOTROPIUM OVALIFOLIUM*, Forsk.; F. B. I. iv. 150. *H. coromandelianum*, Retz; Wt. Ic. t. 1388.

All plains Districts, on waste lands, fallow fields and road-sides, common.

A large erect or decumbent softly white villous herb, often with long branches from a thick root-stock. Flowers white, in long slender ebracteate pairs of spikes, the calyx persistent after the nutlets fall.

4. *HELIOTROPIUM CURASSAVICUM*, Linn.

Coromandel Coast, on salt backwaters as at Madras, Vizagapatam and Tuticorin, common, introduced probably from the W. Indies.

A glaucous fleshy herb with small white flowers, yellow in the centre, in rather short pairs of unilateral spikes.

5. *HELIOTROPIUM INDICUM*, Linn.; F. B. I. iv. 152. *Tiaridium indicum*, Wt. Ill. t. 171.

All plains Districts, on roadsides and in waste places, common.

A coarse annual herb reaching 2 ft. in height, with pale violet small flowers in long spikes, the leaves large.

6. *HELIOTROPIUM ZEYLANICUM*, Lamk., Duthie Fl. Gang. Pl. ii. 93, not of F. B. I. *H. paniculatum*, R. Br.; F. B. I. iv. 151. *H. linifolium*, Lehm.; Wt. Ic. t. 1391.

N. Circars, Deccan and Carnatic.

An erect herb with stout rootstock and long twiggy branches bearing conspicuously long slender racemes of distant flowers, especially in fruit, the flowers rather large, the limb white, the tube yellow, the leaves very narrow.

7. *HELIOTROPIUM BRACTEATUM*, R. Br.; F. B. I. iv. 151. *H. laxiflorum*, Roth.

N. Circars, Deccan and Carnatic, on dry rocky hills, in Cud-dapah at Guramkonda up to 3,000 ft.; Kambakam Drûg in Chingleput.

A slender erect herb reaching 2 ft. in height, softly strigosely hirsute, the racemes with rather large bracts.

8. *HELIOTROPIUM BREVIFOLIUM*, Wall. *H. strigosum* var. *brevifolia*, C. B. Clarke; F. B. I. iv. 151.

Deccan and Carnatic, up to 5,000 ft. in hilly country.

A much-branched undershrub with narrow very white strigose leaves.

9. *HELIOTROPIUM ROTTLEI*, Lehm.; F. B. I. iv. 151; Wt. Ic. t. 1392.

Deccan, about Coimbatore, usually on black cotton soil.

A stiff undershrub, much spreading and covering many feet of surface (Wight), all parts, including the flowers, very white.

10. *HELIOTROPIUM SCABRUM*, Retz.; F. B. I. iv. 152; Wt. Ic. t. 1389. *H. marifolium*, Retz.; F. B. I. iv. 152 in part.

All plains Districts, on sandy lands, waste places, roadsides, etc., common.

A much branched woody herb growing in tufts, the branches often procumbent, rarely ascending, flowers white, crowded among the upper leaves.

Var. *Wallichii*. *H. marifolium* var. *Wallichii*, C. B. Clarke, F. B. I. iv. 152; Wt. Ic. t. 1390.

Branches more ascending and with longer spikes of flower; leaves narrower, elliptic-oblong. All plains Districts, with the type.

Heliotropium peruvianum, Linn., the Cherry Pie of English gardens, is commonly found in gardens in S. India, especially in the hills, where it grows into a shrub and has fragrant lilac-blue flowers.

7. *Trichodesma*, R. Br.

Coarse erect usually hispid herbs. *Leaves* opposite or alternate, entire, the upper face often covered with prominent white tubercles each with a hair. *Flowers* solitary on axillary pedicels, but passing into terminal racemes by the gradual reduction of the floral leaves. *Calyx* deeply 5-lobed, enlarged in fruit; lobes triangular-lanceolate. *Corolla*-tube cylindric or campanulate; throat naked but sometimes with glandular spots; lobes 5, twisted to the left, often mucronate or apiculate. *Stamens* 5, on the corolla-tube; filaments short; anthers elongate-lanceolate, connivent in a cone, the connective produced and its tips sometimes twisted. *Ovary* 4-celled; ovules solitary in the cells; style slender; stigma small. *Fruit* pyramidal, with a central quadrangular carpophore with 4 bays each with an ovoid oblong nutlet adnate to the torus, the nutlets smooth or tuberculate, often margined and sometimes glochidiate. *Seeds* suborbicular or obovoid, exalbuminous; cotyledons plano-convex, fleshy; radicle short.

Calyx-lobes hastate at base; corolla-tube as long as the lobes, which are rounded and slenderly abruptly apiculate and recurved in flower; glandular spots on the throat 2 to each lobe; stamens closely connivent, densely shortly hirsute, the tips with spirally twisted hair-like points; nutlets smooth on the outer, rugosely regularly pitted on the inner face; leaves variable, lanceolate or ovate or oblong, cordate or hastate, villous and hispid, up to about 2 in. long, .5 in. broad.

1. *indicum*.

Calyx-lobes cordate or slightly hastate at base; corolla-tube much longer than the short cordate obtuse or apiculate lobes, not recurved in flower; glandular spots to 2 lobes only; stamens separating, the tips pointed, not twisted, shorter than the long tufted hairs of the connective; nutlets smooth on the outer face, the inner ridged in the middle and with a few pits on the margin; leaves oblong, cordate, up to 4 in. long, 2 in. broad, prominently hispid but not villous.

2. *amplexicaule*.

Calyx-lobes rounded at base, softly villous; corolla-tube rather longer than the lobes, which are broadly obovate with an abrupt slender twisted apiculus, and recurved in flower, no glandular spots; stamens connivent but easily separating, densely villous on the back, the tips with spirally twisted ribbon-like points; nutlets smooth on the outer face, the inner spotted or slightly rugose; leaves oblong-lanceolate, up to 8 in. long, 3 in. broad, prominently hispid.

3. *zeylanicum*.

1. *TRICHODESMA INDICUM*, R. Br.; F. B. I. iv. 153; Wt. Ill. t. 172.

All plains Districts by roadsides and on stony dry waste land, often on black cotton soil, common; ascending low elevations in the Hills.

An erect annual grey-villous hispid herb reaching 18 in. in height, with pale blue flowers, sometimes pink or white.

2. *TRICHODESMA AMPLEXICAULE*, DC.; Sedgw. in Rec. Bot. Surv. Ind. vi. 347, not of Roth; F. B. I. iv. 153.

Deccan, in Hyderabad, Bellary and Mysore.

An erect hispid herb with broader leaves than No. 1 and not villous. Sometimes the calyx approaches that of *T. indicum*, but the corolla and stamens are those of *T. amplexicaule*.

3. *TRICHODESMA ZEYLANICUM*, R. Br. ; F. B. I. iv. 154.

All dry Districts, up to 4,000 ft. in the Hills, common.

A large annual herb with light blue flowers in terminal paniculate cymes with long drooping pedicels, and many reduced leaves.

8. *Cynoglossum*, Linn.

Erect biennial or perennial herbs. *Leaves* alternate, the radical petioled, the cauline sessile. *Flowers* in elongated sparingly branched or loosely paniculate racemes, purple or blue, ultimately distant; bracts 0. *Calyx* 5-lobed, spreading in fruit, sometimes enlarged. *Corolla*-tube short with 5 obtuse or emarginate scales in the throat; lobes 5 spreading, obtuse, imbricate in bud. *Stamens* 5, inserted on the corolla-tube, included; filaments short; anthers ovate. *Ovary* 4-lobed from a nearly flat receptacle; ovules horizontal, attached to the inner angle of the cell; style gynobasic from between the bases of the lobes, short or long, persistent; stigma small. *Fruit* a depressed pyramid of 4 nutlets adnate to a conic-based carpophore, their bases produced downwards, the outer faces convex or flattened, margined or not, glochidiate. *Seeds* straight or little curved; cotyledons flattened, radicle short.

Stems and branches of inflorescence softly appressed grey-pubescent, the young racemes tawny-villous; leaves thick, oblong-lanceolate, prominently nerved, the nerves joining in arches; flowers pink in bud, then blue, rather large, nearly 25 in. long; nutlets margined with a row of prickles, others on the faces...1. *furcatum*. Stems and branches of inflorescence with strigose villous hairs usually with bulbous bases; leaves thin, elliptic-lanceolate, the nerves distant and not prominent; flowers pale lilac or light blue, small, scarcely 15 in. long; nutlets not prominently margined, covered with glochidiate prickles

2. *denticulatum* var. *zeylanicum*.

1. *CYNOGLOSSUM FURCATUM*, Wall. ; F. B. I. iv. 155; Wt. Ic. t. 1395.

W. Gháts, from S. Canara and Mysore southwards, above 4,000 ft.; Shevaroy, Kollimalai and other hills of the Carnatic.

An erect annual reaching 3 ft. in height, with the inflorescence branching sparingly and prominently furcately in long racemes.

2. *CYNOGLOSSUM DENTICULATUM*, A. DC. ; F. B. I. iv. 157. Var. *zeylanicum*, C. B. Clarke.

N. Circars, Deccan and Carnatic, in hilly country, 1,000—6,000 ft.; W. Gháts, on the E. side and towards the south.

An erect annual reaching about 2 ft. in height, the inflorescence with many branches in long slender racemes, the basal leaves often very long-petioled.

9. *Paracaryum*, Boiss.

Erect or decumbent biennial or perennial herbs. *Leaves* alternate. *Flowers* in elongate, sparingly branched, usually ebracteate often paniculate racemes, violet or blue. *Calyx* 5-lobed, spreading in fruit, not much enlarged. *Corolla*-tube short with 5 rather large obtuse or emarginate scales in the throat; lobes 5, spreading, obtuse, imbricate in bud. *Stamens* 5, inserted on the corolla-tube; filaments slender; anthers oblong, included or slightly exserted. *Ovary* 4-lobed from a flat receptacle;

ovules attached to the inner angle; style short or long; stigma small. *Fruit* a pyramid of 4 nutlets attached to a conical or columnar carpophore, their apices not or slightly produced, their bases rounded, glochidiate; margins membranous and inflexed glochidiate, enclosing the flattened slightly hispid surface. *Seeds* straight, margined; cotyledons flattened; radicle small.

Flowers pale blue with a darker centre, corolla .25 in. long, anthers included in the tube; inflorescence branches slender; nutlets rather sparingly glochidiate, the ring formed by the racemed margins triangular in shape; radical leaves very long petioled, blade up to 6 in. long, cordate, cauline ovate, membranous, the nerves obscure.....1. *coelestinum*.

Flowers dark blue, uniform, corolla .5 in. long, anthers slightly exsert from the tube; inflorescence branches thick and rather short; nutlets much glochidiate, the ring circular; radical leaves long-petioled, blade up to 8 in. long, deeply cordate, cauline ovate, cordate, thick, the nerves conspicuous.....2. *malabaricum*.

1. PARACARYUM COELESTINUM, Benth.; F. B. I. iv. 160. *Echinosperrum coelestinum*, Wt. Ic. t. 1394.

Bababudan Hills of Mysore (Law).

An erect branching nearly glabrous herb reaching 5 ft. in height, the stems red (Cooke).

2. PARACARYUM MALABARICUM, C. B. Clarke; F. B. I. iv. 160.

Canara and Mysore (Law).

An erect stout branching tomentose herb reaching 3 ft. in height, the stems green (Cooke).

Family CV. CONVOLVULACEAE.

Herbs or shrubs, usually twining, rarely trees. *Leaves* alternate or in parasitic species 0; stipules 0. *Flowers* regular, hermaphrodite, in pedunculate axillary bracteate cymes, rarely solitary. *Calyx* free, often persistent, of 5 sepals which are often unequal and sometimes accrescent. *Corolla* campanulate or funnel-shaped or subrotate; limb entire, shortly lobed, often plicate in bud. *Stamens* 5, on the corolla-tube; filaments usually slender, sometimes enlarged at base; anthers linear or oblong, dorsifixed, dehiscing longitudinally. *Disk* usually annular. *Ovary* superior, 1—4-celled; ovules 2, less commonly 1 or 4, in each cell; style filiform, simple or forked; stigma capitate or 2-lobed or stigmas 2. *Fruit* a berry or capsule dehiscing by 2 valves or circumsciss or irregularly. *Seeds* 4—2, rarely 1, erect; albumen scanty or 0; cotyledons generally plaited, often 2-lobed, rarely flat, not apparent in *Cuscuta*; radicle next the hilum.

Erect or climbing plants with leaves, not parasitic:—

Pollen grains spinulose:—

Fruit indehiscent, woody mealy or fleshy:—

Corolla salver-shaped; stigmas 2, their lobes linear-oblong.....1. *Rivea*.

Corolla funnel-shaped; stigma biglobose:—

Sepals large, accrescent and completely enclosing the fruit...2. *Stictocardia*.

Sepals small, ovate or oblong, not enlarging to enclose the fruit:—

Ovary 4-celled.....3. *Argyreia*.

Ovary 2-celled.....4. *Lettsomia*.

- Fruit dehiscent or if indehiscent thin and fragile-walled:—
 Stamens arising directly from the corolla-tube:—
 Corolla usually campanulate; sepals not aristate; stamens not exerted
 5. *Ipomaea*.
 Corolla usually salver-shaped; sepals aristate:—
 Flowers small, red, rather irregular.....6. *Quamoclit*.
 Flowers large, white or purple, regular.....7. *Calonyction*.
 Stamens arising from the backs of 5 scales at the base of the corolla-tube;
 corolla small, urceolate; fruit 4-valved.....8. *Lepistemon*.
 Pollen grains not spinulose:—
 Fruit dehiscent, or, if not, small, with thin fragile walls; style or styles
 present; leaves usually thin:—
 Sepals much enlarged in fruit; flowers in racemes or panicles; capsule
 1-seeded, indehiscent, rarely 2-valved; style entire or 2-lobed.....9. *Porana*.
 Sepals not or slightly enlarged in fruit; capsule dehiscing valvately or
 circumsciss or irregularly:—
 Styles 2, free or partly united below:—
 Capsule sessile in the middle of a large flat bract.....10. *Neuropeltis*.
 Capsule not sessile on a bract:—
 Corolla-lobes imbricate; flowers usually solitary, axillary; styles 2,
 quite free; stamens exerted.....11. *Cressa*.
 Corolla-lobes induplicate-contorted; flowers cymose; stamens not
 exerted:—
 Capsule 4-valved; styles free, each 2-branched; stigmas on the
 inner face of the style arms.....12. *Evolvulus*.
 Capsule irregularly dehiscent; styles usually partly united below,
 not branched above; stigmas 2, capitate.....13. *Breweria*.
 Styles entire; stigmas usually 2-lobed:—
 Ovary 1-celled; capsule 4-valved, 3-seeded; stigma-lobes short, oblong
 14. *Hewittia*.
 Ovary 2-, sometimes 4-celled:—
 Outer sepals larger than inner and decurrent on the peduncle;
 stigma-lobes globose.....15. *Aniseia*.
 Outer sepals not larger than the inner and not decurrent:—
 Stigma lobes elongate:—
 Stems erect or prostrate, rarely twining; stigma-lobes oblong or
 linear; capsule 4-valved.....16. *Convolvulus*.
 Stems twining, rarely prostrate; stigma-lobes elliptic; capsule
 usually 8-valved.....17. *Jacquemontia*.
 Stigma biglobose:—
 Capsule 4-valved; stems not usually winged.....18. *Merremia*.
 Capsule dehiscing circumsciss or irregular; stems winged
 19. *Operculina*.
 Fruit indehiscent, woody or fleshy, rather large; style short or 0; stigma
 5—10-rayed; corolla-lobes obcordate; leaves coriaceous.....20. *Erycibe*.
 Parasitic leafless twining herbs; corolla-lobes imbricate; embryo spiral
 21. *Cuscuta*.

1. *Rivea*, Choisy.

Erect and straggling or climbing shrubs. *Leaves* cordate, apiculate, more or less silky-pubescent beneath; petiole long. *Flowers* axillary, on 1—3- or sometimes more-flowered peduncles; bracts 2—3, narrow. *Calyx* of 5 ovate or oblong subequal sepals. *Corolla* large, white, salver-shaped; tube narrow, cylindric; lobes of the limb rounded, plicate. *Disk* annular. *Stamens* included, near the middle of the tube; filaments slender, villous at the base; anthers narrow oblong; pollen grains spinulose. *Ovary* 4-celled with 4 ovules; style filiform; stigmas 2, linear-oblong, rugose. *Fruit* subglobose, dry, indehiscent or breaking up irregularly, often 1-celled by the absorption of the septa. *Seeds*

4 or fewer, glabrous, surrounded by mealy pulp; cotyledons much folded; radicle thick.

Peduncles usually 1-flowered; corolla usually glabrous without; sepals ovate obtuse; leaves usually about 2 in. long, 3 in. broad, sparsely grey-silky beneath, the basal sinus shallow.....1. *hypocrateriformis*.
Peduncles usually 3- or more-flowered; corolla white-silky without; sepals oblong or lanceolate, acute; leaves about 3 in. long, 4 in. broad, densely white silky-tomentose beneath when young, the basal sinus deep.....2. *ornata*.

1. *RIVEA HYPOCRATERIFORMIS*, Choisy; F. B. I. iv. 184.

N. Circars, Deccan and Carnatic, especially near the sea, in hedges and dry open forests. Clove-scented creeper or Midnapore creeper.

A climbing shrub with large white flowers which open at sunset and close at sunrise and are very fragrant. Bark thin, grey; wood soft, in concentric rings.

2. *RIVEA ORNATA*, Choisy; F. B. I. iv. 183; Wt. Ic. t. 1356.

Deccan and Carnatic, in dry forests, scarce.

A climbing or straggling shrub with large white flowers, night-opening and fragrant, the fruit yellowish brown, dry, the leaves with pits on the back above the petiole.

2. *Stictocardia*, Hallier f.

Climbing shrubs. *Leaves* cordate, long-petioled. *Flowers* axillary on 1-3-flowered peduncles; bracts small, caducous. *Calyx* of 5 orbicular herbaceous subequal sepals, in fruit much enlarged, imbricate, mucilaginous, enclosing the fruit in an apple-like case. *Corolla* widely funnel-shaped, 5-lobed, the limbs plicate, nearly glabrous without. *Stamens* 5, included, filaments villous at base; anthers oblong, straight; pollen-grains spinulose. *Ovary* 4-celled, 4-ovuled; style filiform; stigma 2-globose. *Fruit* thin-walled, dry, indehiscent, closely enveloped in the accrescent calyx. *Seeds* 4, minutely villous.

STICTOCARDIA TILIAEFOLIA, Hallier f. in Engl. Jahrb. xviii. 159.

Argyreia tiliaefolia, Wt. Ic. t. 1358; F. B. I. iv. 184.

W. Coast, S. Canara to Cochin; Carnatic, near Coimbatore about 1,300 ft. (Wight, Fischer), Cumbum Hills of Madura (Beddome).

A diffuse climber with large handsome rose-purple flowers, the leaves up to 5 in. in diam., apiculate, obtuse or sometimes emarginate.

3. *Argyreia*, Lour.

Climbing, sometimes erect shrubs. *Leaves* ovate-cordate to lanceolate, usually pubescent tomentose strigose or silky beneath. *Flowers* axillary, in cymes often many-flowered, often capitate; bracts usually conspicuous. *Calyx* of 5 herbaceous sepals, leathery and little enlarged in fruit, often red within. *Corolla* tubular funnel-shaped, large and showy, red or purple; limb plicate, the parts exposed in bud more or less hirsute, lobes short. *Stamens* 5, included; filaments often enlarged and villous at base; anthers oblong, straight; pollen-grains spinulose. *Disk* annular. *Ovary* 4-celled; ovules 4; style filiform; stigma

2-globose. *Fruit* a dry or fleshy berry. *Seeds* 4 or fewer, embedded in mealy pulp.

Climbing shrubs:—

Leaves glabrous on the upper surface:—

Leaves ovate-oblong to oblong, acute at apex, rounded or cuneate at base, appressed strigose beneath, up to 8.5 in. long, 4 in. broad, the main nerves oblique; cymes few-flowered on stout peduncles; bracts narrowly oblong, .5—1.75 in. long; outer sepals ovate-oblong, inner smaller lanceolate, all strigosely hirsute, berry .5 in. in diam.1. *Daltoni*.

Leaves broadly ovate, rounded or cordate at base:—

Sepals ovate or orbicular, obtuse:—

Sepals thick, .5—7 in. long, densely white-tomentose without; bracts ovate-lanceolate, caudate acuminate, up to 1.5 in. long, thin; leaves broadly ovate-cordate, acute at apex, densely silky-white-tomentose beneath, up to 10 in. or more in diam.2. *speciosa*.

Sepals rather thin, subequal, .2—3 in. long, with sparse strigose hairs without; bracts linear- or oblong-lanceolate, .5—1 in. long, sparsely hairy; leaves broadly ovate, cordate or nearly rounded at base, acuminate at apex, up to 6 in. in diam., sparingly strigose beneath.3. *populifolia*.

Sepals lanceolate, acute or acuminate:—

Sepals unequal, the 2 outer longer and often caudate, about .75 in. long, the 3 inner acuminate, shorter, all sparsely stiff strigose on the back and tips; bracts linear-oblong, about 1 in. long, villous; leaves ovate or deltoid, acute or acuminate at apex, rounded truncate or cordate at base, up to 7 in. long, 4 in. broad, sparsely strigose beneath.4. *involuta*.

Sepals subequal, with scarious margins, acuminate, .4 in. long, strigose on the back; bracts oblong-lanceolate or oblanceolate, .75—1.25 in. long, tawny-villous; leaves broadly ovate, usually obtuse or sometimes emarginate at apex, truncate or slightly cordate at base, densely tawny tomentose beneath, up to 6 in. in diam.5. *bracteata*.

Leaves hairy on the upper surface:—

Bracts orbicular, persistent, softly pubescent, .5 in. in diam.; sepals also orbicular or broadly obovate, pubescent, the 2 inner narrower than the others; leaves broadly ovate, shortly acuminate, cordate at base with rounded lobes, pubescent on both sides, up to 4 in. in diam.6. *cymosa*.

Bracts linear or oblong:—

Sepals unequal, narrow, linear-oblong or -lanceolate:—

Two outer sepals linear-oblong, .6 in. long, inner 3 lanceolate-acuminate, .4 in. long; bracts large, tawny-silky, 1—1.5 in. long, nerved; leaves ovate, shortly acute, rounded or slightly cordate at base, sparsely hispid above, densely silky beneath, up to 4 in. long, 2.5 in. broad.7. *sericea*.

Sepals lanceolate acuminate, outer ones .6 in. long, inner less; bracts narrowly oblong, very white-silky, .5—1 in. long, not nerved; leaves ovate, acute, slightly cordate at base, strigose-hispid above, silky beneath, up to 3.5 in. long, 1—1.5 in. broad.8. *Choisyana*.

Sepals nearly equal, usually ovate or lanceolate:—

Sepals acuminate or acute, exposed parts strigose:—

Sepals ovate-lanceolate, acuminate, .3—4 in. long; bracts narrowly linear-oblong, sometimes subspathulate, up to 1 in. long, strigose-hirsute; leaves broadly ovate, acute, rounded or slightly cordate at base, both sides roughly but sparsely fulvous-strigose, the hairs bulbous-basal, up to 7 in. long, 6 in. broad.9. *pilosa*.

Sepals ovate, the outer acute, the inner obtuse, .2 in. long; bracts linear-oblong, .7 in. long; leaves elliptic-ovate, acute, rounded or rhomboid at base, upper side sparsely strigose, lower more densely silvery hairy, up to 5 in. long, 2.5 in. broad.10. *Laurii*.

Sepals ovate, obtuse:—

Sepals, especially exposed parts, strigosely hirsute:—

Branchlets and leaves beneath very softly white-tomentose, upper surface more sparsely so, leaves elliptic-ovate, obtusely acute or sometimes emarginate, up to 3 in. long, 2 in. broad; bracts oblong, silky, caducous, .5—7.5 in. long.11. *pomacea*.

Branchlets and leaves densely covered with golden brown strigose hairs; leaves broadly ovate, abruptly acute, cordate, but not deeply, at base, up to 6 in. in diam.; bracts oblong, persistent, up to 1 in. long or more.....12. *nellygherya*.
 Branchlets sparsely, leaves more densely, covered with grey or slightly golden hairs, strigose above, tomentose beneath; leaves broadly ovate, abruptly acuminate, cordate at base, up to 5 in. or more in diam. and usually broader than long; sepals often subglabrous; bracts linear or linear-oblong, persistent, prominent and often petioled, 1—2 in. long.....13. *hirsuta*.
 Sepals glabrous except for a very few strigose bulbous-based hairs; branchlets pilose; leaves broadly ovate, acute or acuminate, rounded or very slightly cordate at base, sparsely pilose above, fulvous strigose beneath, up to 8 in. long, 5 in. broad; bracts linear, strigose, up to .75 in. long.....14. *coonoorensis*.

Erect shrubs, sometimes slightly climbing:—

Sepals .15—2 in. long, usually obtuse; leaves obovate or elliptic, obtuse or emarginate at apex, and apiculate, cuneate at base, nearly glabrous above, grey silky-villous beneath, up to 4 in. long, 2 in. broad, nerves rather distant.....15. *cuneata*.
 Sepals .2—2.5 in. long, acute; leaves elliptic, acuminate, attenuate at base, glabrous above, densely white-silky beneath and shining, up to 4 in. long, nearly 2 in. broad, nerves close and parallel.....16. *fulgens*.

1. ARGYREIA DALTONI, C. B. Clarke; F. B. I. iv. 190.
 N. Circars, Ganjam to Godavari, in open forests.
 A large climber with red-purple corollas up to 2 in. long.
2. ARGYREIA SPECIOSA, Sweet; F. B. I. iv. 185; Wt. Ic. t. 851.
 N. Circars, Deccan and Carnatic to the E. slopes of the W. Gháts and up to 3,000 ft.; often cultivated and found run wild near villages. The Elephant Creeper.
 A very large climbing shrub with stout white-tomentose stems, long-peduncled cymes, large purple corollas silky-pubescent without and a nearly dry fruit. Vern. *Hind.* Samundar-sok.
3. ARGYREIA POPULIFOLIA, Choisy; F. B. I. iv. 187.
 W. Coast, S. Canara to Travancore.
 A rather slender climber with rose-purple corollas, slightly villous without.
4. ARGYREIA INVOLUCRATA, C. B. Clarke; F. B. I. iv. 187.
 N. Circars, Rampa Hills at 2,500 ft. (V. Narainswami); Bababudan Hills of Mysore (Law); Shevaroy Hills (Bourne).
 A large twining shrub, the corollas pinkish-grey (Narainswami), the bracts conspicuously persistent.
5. ARGYREIA BRACTEATA, Choisy; F. B. I. iv. 188.
 Deccan, common in the Ceded Districts, up to 4,500 ft. on Horsleykonda (Gamble), hills of Salem and Coimbatore; Carnatic, outer hills of Tinnevely.
 A climbing shrub with red-purple corollas, the large bracts conspicuous and persistent.
6. ARGYREIA CYMOSA, Sweet; F. B. I. iv. 190; Wt. Ic. t. 839.
 N. Circars and Carnatic, in coast Districts, in hedges and low scrub.
 A climbing not very shrubby plant with pale pink corollas and rather large soft fruit.

7. *ARGYREIA SERICEA*, Dalz. ; F. B. I. iv. 188.
W. Gháts, Nilgiris to hills of Tinnevely, scarce.
A large silky twiner, with pink corollas 2·5 in. long.
8. *ARGYREIA CHOISYANA*, Wt. ; F. B. I. iv. 190. *Batatas Choisyana*,
Wt. Ic. t. 491.
Deccan, hills of the Ceded Districts—Kondaparthi (Wight),
Cuddapah (Beddome).
A slender procumbent or twining herb with purple corollas
2 in. long, the upper leaves often not broader than ·75 in. and
oblong-lanceolate.
9. *ARGYREIA PILOSA*, Wt. & Arn. ; F. B. I. iv. 189.
Bababudan Hills of Mysore (Law) ; Ramandrug Hills of Bellary
at 3,500 ft. (Gamble).
A large hirsute twiner with dark red or purple corollas, 2 in.
long, the cymes in prominently bracteate capitate heads.
10. *ARGYREIA LAWII*, C. B. Clarke ; F. B. I. iv. 190.
Bababudan Hills of Mysore (Law).
A slender twiner with very white silky stems and long-
peduncled few-flowered cymes, the corollas 2 in. long.
11. *ARGYREIA POMACEA*, Choisy ; F. B. I. iv. 188. *Rivea pomacea*, Wt.
Ic. t. 888.
W. Deccan, in the Coimbatore and Salem Districts ; W. Gháts,
Nilgiris, Anamalais and Pulneys on E. slopes.
A large climber with purple corollas 2 in. long in lax few-
flowered corymbs, and yellowish-brown pulpy fruit, ·7 in. long.
12. *ARGYREIA NELLYGHERYA*, Choisy ; F. B. I. iv. 189. *A. Leschenaultii*,
Choisy ; F. B. I. iv. 188 (?).
W. Gháts, Nilgiri Hills, above 5,000 ft.
A large climber with, apparently, rose purple corollas, the
flowers in long-peduncled corymbs, the fruit ·5 in. in diam.,
black when dry.
13. *ARGYREIA HIRSUTA*, Arn. ; F. B. I. iv. *Rivea hirsuta*, Wt. Ic. t.
891.
W. Gháts, hills of Mysore, Nilgiris and Pulneys, at 3,000—6,000
ft., very common in Nilgiris.
A large shaggy climber with large flowers, the corollas 3 in.
long, pale purple, darker in the centre, the fruit orange-coloured
when ripe.
14. *ARGYREIA COONOORENSIS*, Smith & Ramas. in Rec. Bot. Surv. Ind.
vi. 30.
W. Gháts, Coonoor in Nilgiris, at 6,000 ft. (Meebold).
A large climber with a purple (?) corolla 2 in. long, the flowers
in rather shortly and slenderly peduncled cymes.
15. *ARGYREIA CUNEATA*, Ker-Gawl. ; F. B. I. iv. 191. *Rivea cuneata*,
Wt. Ic. t. 890.
Deccan, in hilly country, usually at 3,000—4,500 ft.
A very pretty silky shrub with bright purple corollas, the cymes
axillary, 3- or more-flowered, the fruit ellipsoid, pointed,
yellowish-brown, dry.

16. *ARGYREIA FULGENS*, Choisy; F. B. I. iv. 191; Wt. Ic. t. 1357.
 W. Gháts, Anamalais and hills of Travancore and Tinnevely,
 about 3,000 ft.
 A silky silvery shrub with (apparently) dark purple corollas,
 the cymes in axillary dichasia of about 7 flowers, the berry
 crustaceous, .5 in. in diam.

4. *Lettsomia*, Roxb.

Climbing shrubs. *Leaves* alternate, rounded rhomboid or cordate at base. *Flowers* in axillary peduncled corymbose or capitate cymes; bracts conspicuous. *Calyx* of 5 orbicular elliptic or oblong sepals, in fruit often thickened and enlarged. *Corolla* tubular funnel-shaped, usually pink, the limb plicate; lobes small. *Stamens* 5, included or exserted; filaments usually enlarged and villous at base; anthers oblong or linear; pollen-grains spinulose. *Disk* annular. *Ovary* 2-celled, 4-ovuled; style filiform; stigma 2-globose. *Fruit* a dry indehiscent berry. *Seeds* 4 or fewer, embedded in mealy pulp.

Corolla under 1 in. long; stamens exserted; leaves densely white-tomentose beneath; sepals in fruit red within; fruit red:—

Leaves ovate, cordate, obtuse or acute, sometimes emarginate, but apiculate, glabrous or strigose-villous on the upper surface, the tomentum of the lower very short; nerves impressed above, up to 4 in. in diam.....1. *aggregata*.
 Leaves broadly ovate, cordate, acute and apiculate, glabrous or slightly villous on the upper surface, white with spreading hairs beneath; nerves slightly raised above, up to 4 in. in diam., often broader than long.....2. *bella*.

Corolla more than 1 in. long; stamens included; bracts deciduous; sepals in fruit brown within:—

Corolla densely strigose without on parts exposed in bud; flowers in spreading corymbiform panicles densely strigose, the sepals ovate or orbicular, thick; leaves broadly ovate, cordate, acute or acuminate, sparsely hirsute, up to 5 in. in diam sometimes small (var *minor*).....3. *retusa*.
 Corolla nearly or quite glabrous without; flowers in loose slender few-flowered corymbs, nearly glabrous, the sepals ovate or orbicular, usually glabrous; leaves elliptic or elliptic-lanceolate, subacute, rounded or rhomboid at base, glabrous or somewhat villous, the nerves often oblique, up to 4 in. long, 2.5 to 3 in. broad.....4. *elliptica*.

1. *LETTSOMIA AGGREGATA*, Roxb.; F. B. I. iv. 191; Wt. Ic. t. 1359.
L. mysorensis, C. B. Clarke; F. B. I. iv. 192.

Deccan and Carnatic, in hilly country; W. Gháts, on E. slopes and also in S. Travancore.

An extensively climbing shrub with pink flowers and red fruit, the bracts very white and orbicular, the 2 outer sepals larger than the inner.

Var. *osyrensis*, C. B. Clarke, but not of Roth and Choisy. Leaves above strigose villous. Hills of the Carnatic.

2. *LETTSOMIA BELLA*, C. B. Clarke; F. B. I. iv. 192.

N. Circars, in Ganjam (Gamble).

A climbing shrub like the former species but with more spreading tomentum, the bracts smaller and oblong, and, like the sepals, covered densely with strigose hairs.

3. *LETTSOMIA SETOSA*, Roxb.; F. B. I. iv. 194; Wt. Ic. t. 1360.

N. Circars, common, especially in Godavari, less so southwards except on the lower E. slopes of the Pulney Hills (Bourne, etc.). A large climber with pink flowers and red berry, the inside of the tough fruiting calyx brown not red.

Var. *minor*, C. B. Clarke. Leaves small, scarcely 2 in. long, 1 in. broad, otherwise the same. Bababudan Hills of Mysore (Law).

4. *LETTSOMIA ELLIPTICA*, Wt.; F. B. I. iv. 192.

Deccan and Carnatic, in hilly country, up to 3,000 ft.; W. Gháts, in all Districts at low levels and up to about 4,000 ft.

A rather bushy climber with pale purple flowers and orange fruit, very variable in the leaves and inflorescence especially as to hairiness and to the obliqueness of the nerves.

5. *Ipomaea*, Linn. (*in part*).

Twining or prostrate herbs, rarely shrubby or erect. *Leaves* alternate, entire or lobed or divided. *Flowers* axillary, solitary or in cymes; bracts various. *Calyx* of 5 equal or unequal, ovate or linear, sepals, often enlarged in fruit. *Corolla* campanulate or funnel-shaped, the limb plicate, very slightly lobed. *Stamens* 5, usually included; filaments filiform or dilated below, often unequal; anthers straight or contorted; pollen-grains spinulose. *Ovary* 2- (rarely 4-) celled; ovules 4, rarely 6; style filiform; stigma capitate, 2-globose. *Fruit* a 4-6-valved capsule, rarely indehiscent. *Seeds* usually 4 or 6, glabrous velvety or woolly; cotyledons crumpled, bilobed.

Leaves entire:—

Sepals, especially the outer, cordate at base, unequal, ciliate, .5 in. long, lengthening in fruit; corolla tubular, .6 in. long, the limb spreading; leaves ovate-cordate, acute or acuminate, the basal sinus deep, up to 3 in. in diam., nearly glabrous; seeds villous and with long silky hairs.....1. *calycina*.

Sepals not cordate at base:—

Sepals enlarged in fruit, outer lanceolate, inner linear, all acuminate and hirsute, .75 in. long in flower; corolla funnel-shaped, the tube slender; glabrous or slightly pubescent, 2-3 in. long; bracts lanceolate, in pairs below the calyx; leaves ovate- or lanceolate-oblong, obtuse or acute, mucronate, subcordate at base, hispid, up to 2 in. long, .5-1 in. broad; seeds puberulous, ciliate on the edges.....2. *barlettoides*.

Sepals not or only slightly enlarged in fruit:—

Flowers in sessile or nearly sessile heads, the corolla small, .5 in. long, campanulate; bracts linear; leaves ovate-triangular, acute, apiculate, cordate at base, villous, up to 3 in. long, 1.5 in. broad; seeds glabrous, minutely pitted.....3. *hispida*.

Flowers in pedunculate cymes or panicles:—

Sepals hispid:—

Flowers in short peduncled few- (1-3-) flowered cymes with small linear bracts; sepals ovate, with spreading hairs from bulbous bases; corolla tubular, scarcely .5 in. long; leaves reniform or ovate-cordate, obtuse, sometimes sinuate or slightly dentate, 1-1.5 in. in diam.; seeds white-velvety4. *rumicifolia*.

Flowers sessile, usually 3-6, enclosed in a perfoliate boat-shaped bract often 2.5 in. broad and .75 in. deep, very long-hairy within; sepals very unequal, the outer obovate or spatulate, the inner linear, densely long-hairy; corolla-tube cylindric, slender, up to 1 in. long, the limb patent; leaves broadly ovate-cordate, acute and apiculate, up to 3 in. in diam.; seeds glabrous except for a few villous hairs on the margins

5. *pileata*.

Sepals glabrous, sometimes slightly pubescent (Nos. 9 and 11):—

Aquatic plants, more or less, prostrate and rooting in mud at the nodes or even floating on water:—

Sepals subequal, smooth, ovate, obtuse, .2—3 in. long; corolla funnel-shaped, up to 2 in. long; leaves variable, ovate or lanceolate or triangular, hastate or cordate at base, the basal lobes usually rounded, up to 5 in. long, 3 in. or less wide, long-petioled; seeds minutely silky-puberulous.....6. *reptans*.
Outer sepals shorter, .3 in. long, much wrinkled, inner longer, .5 in. long, slightly wrinkled, all ovate obtuse; corolla funnel-shaped, up to 2 in. long; leaves ovate-cordate or reniform, subobtusate to even deeply emarginate, up to 4 in. in diam.; seeds glabrous.....7. *repens*.

Land plants, climbing:—

Slender climbers:—

Sepals obtuse, shortly apiculate, the 2 outer slightly shorter, .25 in.; corolla funnel-shaped, 1.5 in. long, the mouth suddenly widened; leaves variable, ovate-cordate with rounded basal lobes to hastate with acute lobes, acute at apex, up to 3 in. in diam. when hastate, indented at the sides and only .5—1 in. broad; seeds .15 in., minutely tawny-velvety.....8. *sepiaria*.
Sepals acute, apiculate, the 2 outer shorter and slightly wrinkled, sometimes slightly pubescent, .15 in.; corolla funnel-shaped, about 1 in. long, the mouth widened; leaves broadly ovate, acuminate, deeply cordate, up to 3 in. in diam.; seeds .2 in., minutely dark brown-velvety.....9. *obscura*.

Stout straggling or climbing shrubs; seeds with long silky hairs:—

Sepals equal, orbicular, sometimes emarginate, .2 in. long; flowers in lax panicles; corolla tubular campanulate, .6 in. long or rather longer; leaves ovate or ovate-deltoid, obtusely acute and often slightly emarginate at apex, truncate or cordate at base, up to 5 in. long, 4 in. broad, prominently about 10-nerved; capsules ovoid, glabrous, .35 in. long; seeds black, the hairs white.....10. *staphylina*.

Sepals subequal, ovate-orbicular, sometimes emarginate, slightly puberulous, .5 in. long, enlarged in fruit; flowers in corymbose cymes; corolla campanulate, 3 in. long; leaves broadly ovate or suborbicular, acuminate, apiculate, cordate at base, up to 6 in. in diam., prominently about 14-nerved; capsules globose, glabrous, .5 in. long; seeds black, the hairs tawny.....11. *campanulata*.

Leaves lobed:—

Leaves emarginately more or less deeply 2-lobed, prostrate herbs of the sea-shore; sepals oblong, obtuse, apiculate, the outer smaller than the inner, .3—5 in. long, glabrous; corolla tubular-funnel-shaped, up to 2.5 in. long; leaves thick, fleshy, parallel-nerved, up to 2 in. long, 3.5 in. broad; seeds with golden-brown pubescence, .3 in. in diam.....12. *Pes-caprae*.

Leaves palmately 3-lobed, sometimes reduced to entire:—

Leaves green beneath, ovate-cordate, the lobes ovate-acuminate, sparsely hairy; calyx-lobes linear or linear-lanceolate, glabrous or strigose-hispid on the base and margins, up to 1 in. long; corolla tubular funnel-shaped, up to 2 in. long; seeds glabrous.....13. *hederacea*.

Leaves white-woolly beneath:—

Flowers in lax cymes, with stem-clasping bracts and bracteoles, the peduncles and pedicels slender, the whole inflorescence strigose-hirsute; sepals lanceolate acuminate, strongly ciliate, .5 in. long, longer in fruit; corolla funnel-shaped, .75 in. long; leaves ovate cordate, from deeply lobed to entire, up to about 5 in. in diam.; seeds grey-velvety, also with few cottony hairs.....14. *pilosa*.

Flowers in long-peduncled yellow-strigose capitate heads with oblong-lanceolate bracts up to 1 in. long; sepals linear-lanceolate, subequal, fulvous-hirsute, .5—7.5 in. long, not longer in fruit; corolla tubular funnel-shaped, 1—1.25 in. long; leaves ovate cordate, from deeply lobed to entire but always sinuate, up to 4 in. in diam.; seeds minutely puberulous.....15. *Wightii*.

Leaves palmatifidly 3-9- (usually 5- or 7-) lobed but variable, sometimes entire, occasionally more or less pedate:—

Flowers in pedunculate capitate heads; leaves rather small and softly hirsute, suborbicular in outline; capsule papery, glabrous; seeds softly grey-velvety, the hairs in small tufts:—

Leaves from ovate-cordate, entire, 1-2 in. in diam., to 3-7-lobed, the lobes ovate, acute, narrowed at base; outer bracts broadly ovate-cordate, strigose, .75 in. long, inner smaller; sepals unequal, the outer spatulate, inner linear-lanceolate; corolla small, campanulate, .7 in. long.....16. *bracteata*.

Leaves from entire or dentate to deeply 5-9-lobed, up to 5 in. in diam., the lobes ovate-acuminate, narrowed at base, outer bracts ovate-oblong, hirsute, .75-1 in. long, inner smaller; sepals unequal, the outer oblong-lanceolate, inner lanceolate-acuminate, all strigose; corolla tubular-campanulate, about 1 in. long.....17. *Pes-tigridis*.

Flowers in pedunculate corymbose panicles; leaves large and glabrous, broadly ovate in outline, usually 5-7-lobed:—

Sepals orbicular, obtuse, glabrous, .3-4 in. long; corolla widely campanulate, glabrous, 2-3 in. long; leaves 4-6 in. in diam., the lobes ovate lanceolate acuminate; seeds with many long tawny cottony hairs reaching .25 in. long.....18. *paniculata*.

Sepals elliptic-oblong, obtuse or slightly acute, .7-1 in. long, glabrous; corolla tubular-campanulate, 2 in. long; leaves 3-5 in. in diam., the lobes lanceolate acuminate; seeds glabrous.....19. *Kentrocaulos*.

Leaves digitate, of 5-7 linear or lanceolate leaflets mucronate at tip and 1.5 in. long; sepals elliptic, glabrous, .3-4 in. long, scarious on the margins; corolla campanulate, 1.5 in. long; seeds glabrous, shining, glandular, crested.....20. *quinata*.

Leaves pedate, sometimes only palmate or digitate:—

Leaflets toothed, the leaves small, petioles with small stipule-like leaves at their base:—

Leaves normally pedately 5-foliolate, the side-lobes small, the mid-lobe up to 1.5 in. long, spatulate, all serrate; flowers usually solitary, small; sepals lanceolate, cuspidate, rugose on the back, .2 in. long; corolla tubular, .3-5 in. long; capsule glabrous, papery; seeds puberulous.....21. *dissecta*.

Leaves pedately 5-7-foliolate, the mid-lobe obovate, about 1 in. long, .5 in. broad, the side lobes similar but rather smaller, all coarsely serrate, sometimes very narrow; flowers 1-3 but usually solitary on long peduncles; sepals elliptic, mucronate, slightly rugose, .2-3 in. long; corolla 3 in. long, the tube long and very slender; capsule glabrous, papery; seeds shortly silky.....22. *laciniata*.

Leaflets entire, the leaves fairly large:—

Leaves palmately pedate, 5-7-lobed, the mid-lobe slightly the largest, elliptic-lanceolate, acute, mucronate, up to 2.5 in. long, 1 in. broad, the others smaller and more obtuse, petioles with stipular leaves at their base; sepals ovate, obtuse, .25 in. long; corolla large, funnel-shaped, up to 2 in. long; capsule ovoid; seeds tawny-pubescent, the margins with long white silky hairs.....23. *cairica*.

Leaves pinnatifidly pedate or doubly tripartite, usually 9-lobed, the lobes elliptic or lanceolate, mucronate, up to 2.5 in. long, .75 in. broad, petioles with stipular leaves at their base; sepals ovate obtuse or emarginate, slightly pouched at base, .3 in. long; corolla-tube cylindric, limb widely spreading, in all 2 in. long; seeds tawny-velvety, the margins with long silky tawny hairs.....24. *dasyperma*.

1. IPOMAEA CALYCINA, C. B. Clarke; F. B. I. iv. 201. *Aniscia calycina*, Chois.; Wt. Ic. t. 833.

W. Ghâts, Wynaad, hills of Coimbatore, at 1,000-3,000 ft.

A slender twiner with pink flowers in slender few-flowered cymes.

2. IPOMAEA BARLERIOIDES, Benth. & Hook. f.; F. B. I. iv. 201.

N. Circars, Mahendragiri in Ganjam, Madgol Hills of

Vizágapatam, at 3,000—4,000 ft.; W. Gháts, Mysore and Coimbatore to Tinnevely Hills, chiefly E. side, at about 4,000 ft.

A trailing hispidly tawny hairy plant of grassy places with large purple corolla.

3. IPOMAEA HISPIDA, Roem. & Sch. *I. eriocarpha*, R. Br.; F. B. I. iv. 204. *I. sessiliflora*, Roth; Wt. Ic. t. 169.

All Districts in the plains and up to 4,000 ft. in the hills, in dry localities.

A slender twining villous plant with small pink flowers.

4. IPOMAEA RUMICIFOLIA, Choisy; F. B. I. iv. 207.

Deccan and Carnatic, usually on black cotton soil.

A trailing annual herb with yellowish or white flowers.

5. IPOMAEA PILEATA, Ronb.; F. B. I. iv. 203; Wt. Ic. t. 1363.

W. Coast, from S. Canara to Travancore; W. Gháts, Anamalais and hills of Cochin, to about 2,000 ft.

A well-marked annual twining herb with bright pink corolla and conspicuous very softly long hairy involucral bracts.

6. IPOMAEA REPTANS, Poir. *I. aquatica*, Forsk.; F. B. I. iv. 210.

All plains Districts, on the margins of tanks and in other wet places, often floating on the surface, often planted.

An annual or biennial pretty water plant with hollow stems, pink corolla darker in the throat and few-flowered cymes. The young shoots, leaves and roots are eaten. Vern. *Hind.* Kalmi.

7. IPOMAEA REPENS, Lam. *I. Beladamboe*, Roem. & Sch.; F. B. I. iv. 209. *I. rugosa*, Choisy; Wt. Ic. t. 887.

Plains Districts, especially near the coast, trailing and rooting in wet places, on the margins of tanks and back-waters.

A rather thick glabrous plant with purple or white flowers in rather many-flowered cymes. In Tinnevely specimens the leaves are sometimes very large, deeply lobed both at base and apex.

8. IPOMAEA SEPIARIA, Koch.; F. B. I. iv. 209; Wt. Ic. t. 838.

All plains Districts and to some altitude in the hills, in hedges and by tanks, especially near the coast.

A twining perennial with usually villous stems, the flowers pink with purple tube, the leaves variable, the peduncles and pedicels often thickened in fruit.

9. IPOMAEA OBSCURA, Ker-Gawl.; F. B. I. iv. 207.

All plains Districts, in grass and hedges.

A twining or trailing annual, the flowers yellow or white with a purple tube, the leaves thin, cordate, sometimes pubescent (var. *gemella*, C. B. Clarke), but more often glabrous.

10. IPOMAEA STAPHYLINA, Roem. & Sch.; F. B. I. iv. 210. *I. racemosa*, Roth; Wt. Ill. t. 168.

All forest Districts from Vizianagram southwards, chiefly in hilly country and up to 4,000 ft.

A large straggling or climbing shrub with white flowers purple in the tube.

11. IPOMAEA CAMPANULATA, Linn.; F. B. I. iv. 211; Wt. Ic. t. 1375.

Hills of the Deccan and E. slopes of the W. Gháts, south to Tinnevely and S. Travancore, up to 3,000 ft.

- A large climber with white or pale rose-coloured flowers, purple in the tube.
12. *IPOMAEA PES-CAPRAE*, Sweet. *I. biloba*, Forsk.; F. B. I. iv. 212.
Both coasts, on sandy shores and sandy river banks, common.
Goat's Foot Creeper.
An extensively creeping and sand-binding plant with a thick long rootstock, handsome purple-red flowers and curious bilobed leaves. Very useful in checking blown sand (see H. Cleghorn in Madr. Journ. i. t. 3). Vern. *Hind.* Dopate luta; *Ur.* Kansarinata; *Mal.* Schovanna.
 13. *IPOMAEA HEDERACEA*, Jacq.; F. B. I. iv. 199.
Deccan and Carnatic, to the E. slopes of the W. Ghâts and up to 3,500 ft., probably introduced and run wild, often cultivated. A slender climber with retrorsely villous stems, flowers with blue or pink corollas and long sepals. The leaves are sometimes nearly or quite entire, ovate- or orbicular-cordate (var. *integrifolia*, Chois.).
 14. *IPOMAEA PILOSA*, Sweet; F. B. I. iv. 213; Wt. Ic. t. 837.
Deccan and Carnatic, from Anantapur to Tinnevely, at the E. foot of the W. Ghâts.
An annual climber, very softly hirsute, the flowers rose pink.
 15. *IPOMAEA WIGHTII*, Chois.; F. B. I. iv. 203; Wt. Ic. t. 1364.
N. Circars, hills of Ganjam and Vizagapatam, about 3,000 ft.; W. Ghâts, Wynaad and Coimbatore, Nilgiris, Anamalais, Pulneys and hills of Travancore and Tinnevely, 3,000—6,000 ft.
A climbing strigose undershrub with pink-purple flowers.
 16. *IPOMAEA BRACTEATA*, Wt. Ic. t. 1374; F. B. I. iv. 203.
W. Ghâts, Anamalais and hills of Cochin and Travancore, up to 2,000 ft.
A slender climber, typically with ovate-cordate leaves but more often with lobed ones (var. *lobata*, C. B. Clarke). The corollas are bluish-purple with a darker eye (Fischer).
 17. *IPOMAEA PES-TIGRIDIS*, Linn.; F. B. I. iv. 204; Wt. Ic. t. 836.
All Districts from the N. Circars southwards, especially the dry ones, common on hedges and bushes.
A very hairy climber with white or pink flowers and curiously lobed leaves, cut to about .5 in. from the top of the petiole, in a rounded sinus.
 18. *IPOMAEA PANICULATA*, R. Br. *I. digitata*, Linn.; F. B. I. iv. 202.
Deccan, probably cultivated and run wild only; W. Coast, from S. Canara to Travancore.
A large perennial climber with pink or red-purple flowers in long-peduncled corymbs of 10—20, fewer in end axils.
 19. *IPOMAEA KENTROCAULOS*, C. B. Clarke; F. B. I. iv. 213.
E. and W. Coasts, scarce.
A stout climber with flowers in few-flowered cymes.
 20. *IPOMAEA QUINATA*, R. Br.; F. B. I. iv. 214.
Hills of Coimbatore, at Tattakarai Gbat, 2,400 ft. (Fischer).
A slender prostrate twiner with white or purplish flowers.

21. *IPOMAEA DISSECTA*, Willd.; F. B. I. iv. 200.
E. Coast from Masulipatam southwards, on coast sands.
A prostrate perennial herb with small white flowers.
22. *IPOMAEA LACINIATA*, C. B. Clarke; F. B. I. iv. 200.
Bababudan Hills of Mysore (Law); Mahendragiri Hill in Tinnevely.
A slender creeper with long-tubed large white flowers. The Tinnevely specimens are of the form with very narrow lobes to the leaves.
23. *IPOMAEA CAIRICA*, Sweet. *I. pulchella*, Roth; Wt. Ic. t. 156. *I. palmata*, Forsk.; F. B. I. iv. 214.
Deccan, in various places, probably run wild; much cultivated in gardens. The Railway Creeper.
A beautiful climber with large purple flowers.
24. *IPOMAEA DASYSERMA*, Jacq.; F. B. I. iv. 215; Bot. Mag. t. 8788.
Occasional about Madras, probably run wild or cultivated only.
A slender climber with flowers yellow with a purple centre.

Besides the species enumerated, some of which are really garden plants that have apparently run wild, a few others are to be found in cultivation. *I. Batatas*, Poir., is the Sweet Potato, in common cultivation as a vegetable. *I. Learii*, Paxt., is an American species allied to *I. hederacea* with large dark-blue flowers turning to red, often grown on walls and trellises. *I. purpurea*, Roth, also resembling *I. hederacea* and sometimes found run wild, has large flowers with deflexed pedicels, of various shades from white to pale blue or purple and is known as "Morning Glory." *I. carnea*, Jacq., is a straggling, shrubby, S. American species with a rose-purple corolla, common in Madras gardens.

6. Quamoclit, Moench.

Annual twining glabrous herbs. *Leaves* cordate and angled or lobed, sometimes pinnately divided. *Flowers* axillary, in few-flowered cymes; bracts small. *Calyx* of 5 aristate sepals, subequal or the outer rather the smaller. *Corolla* salver-shaped, slightly irregular, the tube slender or slightly funnel-shaped, the limb spreading. *Stamens* 5, much exserted; filaments unequal. *Ovary* glabrous, 4-celled, with 4 ovules; style rather longer than the stamens; stigma 2-globose; pollen-grains spinulose. *Fruit* a 4-celled 1-valved capsule, the septa thin, persistent. *Seeds* 4, black, pubescent or glabrous.

Leaves ovate-cordate, acute, entire or lobed; calyx-lobes acuminate; corolla scarlet or orange; seeds pubescent.....1. *phoenicea*.
Leaves deeply pinnately dissected, the segments linear; calyx-lobes elliptic; corolla dark red or white; seeds nearly glabrous.....2. *pinnata*.

1. QUAMOCLIT PHOENICEA, Choisy. *Ipomaea coccinea*, C. B. Clarke; F. B. I. iv. 199.
All plains Districts, run wild, introduced from S. America. A weak slender twiner.
2. QUAMOCLIT PINNATA, Boj. *Ipomaea Quamoclit*, Linn.; F. B. I. iv. 199.
All plains Districts, cultivated and run wild, introduced from Tropical America.

7. *Calonyction*, Choisy.

Large herbaceous climbers; stems often warted. *Leaves* large, cordate, entire or angled. *Flowers* solitary or in few-flowered axillary cymes; bracts caducous. *Calyx* of 5 herbaceous sepals, subequal or the outer smaller, usually aristate. *Corolla* large, glabrous, regular, salver-shaped, white or rose-purple; tube narrow, long, cylindric; limb plicate. *Stamens* 5, exserted; pollen-grains spinulose. *Ovary* 2-celled, 4-ovuled; style filiform; stigma 2-globose. *Fruit* a 4-valved capsule. *Seeds* 4, dull, glabrous.

Corolla white, tube about 3 in. long; stamens exserted; seeds yellow; stout plant

1. *Bona-nox*.

Corolla rose-purple, tube 1—2 in. long; stamens included; seeds black; slender plant.....2. *muricatum*.

1. CALONYCTION BONA-NOX, Boj. *Ipomaea Bona-nox*, Linn.; F. B. I. iv. 197.

Most Districts, in hedges and ravines, wild and cultivated, but perhaps not truly indigenous, Moonflower.

A large climber with large cordate long apiculate leaves and large white flowers. The flowers, which are sweet-scented, open only at night and are succeeded by a capsule with 4 yellow seeds.

2. CALONYCTION MURICATUM, G. Don. *Ipomaea muricata*, Jacq.; F. B. I. iv. 197.

East Coast (Wight, Shuter), probably cultivated only; Rampa Hills of Godavari (Narayanswami).

A slender climber with cordate leaves. The purplish flowers, sometimes white streaked with pink, have thickened peduncles which are sometimes eaten.

8. *Lepistemon*, Bl.

Climbing herbs with villous stems. *Leaves* cordate, often lobed. *Flowers* in very dense axillary cymes; bracts narrow, deciduous. *Calyx* of 5 subequal sepals, acute or obtuse. *Corolla* urceolate, the limb shortly 5-lobed. *Stamens* 5, included; filaments at the base arising from the backs of 5 subequal concave scales arched over the ovary; anthers ovate, pollen grains spinulose. *Disk* large, cupular. *Ovary* 2-celled, ovules 2 in each cell; style very short; stigma capitate. *Fruit* a 4-valved capsule. *Seeds* glabrous.

LEPISTEMON LEIOCALYX, Stapf in Kew Bull. 1895, 113.

W. Ghâts, hills of Travancore near Koni, in secondary forest (Bourdillon); Wynaad, at Nadugani (Lawson).

A villous climber with ovate deeply cordate long acuminate leaves up to 5 in. long, 4 in. broad, and yellow flowers, the calyx-lobes with a few hairs at the base only.

9. *Porana*, Burm.

Large climbing shrubs. *Leaves* alternate, entire, petioled. *Flowers* white blue or purple, in racemes often much paniced; bracts persistent. *Calyx* of 5 small sepals when in flower, when in fruit the outer or all

much enlarged, spreading, prominently ribbed and nerved. *Corolla* campanulate or funnel-shaped, usually small, with a wide or narrow mouth; limb plicate, sub-entire or lobed. *Stamens* 5, usually included; filaments filiform; pollen grains not spinulose. *Ovary* 1- or 2-celled; ovules 2 or 4; style slender with a single 2-lobed or 2 capitate stigmas. *Fruit* a globose, oblong or obconic, membranous capsule, indehiscent or 2-valved. *Seed* 1, glabrous; cotyledons plicate.

PORANA MALABARICA, C. B. Clarke; F. B. I. iv. 223.

W. Gháts, from the Bababudan Hills of Mysore to the Nilgiris, Anamalais, Pulneys and hills of Travancore, up to 6,000 ft.

An extensively ramified climber with slender branches, ovate-cordate long-acuminate leaves and white flowers in lax racemes, the papery fruiting sepals elliptic, about .5 in. long, .25 in. broad, with 5—7 prominent ribs and prominent reticulation.

P. paniculata, Roxb., a large species common in N. India, is occasionally cultivated in gardens. It has dense masses of white flowers which hang in festoons from its supports. It is sometimes called the Bridal Creeper. *P. volubilis*, Burm., a Malay species, is also common in gardens on both coasts of the Peninsula.

10. *Neuropeltis*, Wall.

Large climbing shrubs, the shoots and inflorescence rufous-pubescent. *Leaves* alternate, oblong, petioled. *Flowers* in racemes, axillary or subpaniculate towards the ends of the branches; bract under the calyx inconspicuous in flower, much enlarged in fruit. *Calyx* of 5 subequal suborbicular sepals, scarcely enlarged in fruit. *Corolla* broadly campanulate, deeply 5-lobed, the lobes induplicate-valvate in bud. *Stamens* exserted or included; filaments filiform; anthers oblong. *Ovary* imperfectly 2-celled, 4-ovuled; styles 2, separate from the base, shortly linear; stigmas large, globose. *Fruit* a globose 4-valved 1-seeded capsule, sessile or shortly stalked in the middle of the flat enlarged bract. *Seed* globose, glabrous, albuminous, the cotyledons plicate.

NEUROPELTIS RACEMOSA, Wall.; F. B. I. iv. 225; Bedd. Ic. t. 291.

W. Gháts, Tambracheri Ghát in Malabar (Beddome).

A large climber with conspicuous peltate bracts in fruit, the leaves elliptic-oblong, up to 4.5 in. long, rufous-pubescent when young, afterwards nearly glabrous.

11. *Cressa*, Linn.

Small erect branching undershrubs, grey-pubescent. *Leaves* small, entire. *Flowers* small, sessile in the upper axils or in terminal spikes or clusters. *Calyx* of 5 subequal imbricate sepals. *Corolla* small, funnel-shaped, the tube short; lobes 5, ovate, imbricate in bud. *Stamens* 5, exserted; filaments filiform. *Ovary* 2-celled, ovules 2 in each cell; styles 2, distinct; stigmas capitate. *Fruit* a 2—4-valved capsule 1—4-seeded. *Seeds* glabrous; cotyledons linear, plicate.

CRESSA CRETICA, Linn.; F. B. I. iv. 225.

Dry plains Districts, on sandy plains, fallow fields and black cotton soil.

A small dwarf shrub up to 15 in. high, very grey, the corolla white, the small leaves elliptic, acute.

12. *Evolvulus*, Linn.

Small herbs or undershrubs, prostrate or erect, usually silky-pubescent. *Leaves* small, entire, often distichous. *Flowers* small, white blue or pink, solitary or in few-flowered pedunculate cymes. *Calyx* of 5 subequal sepals, not enlarging in fruit. *Corolla* rotate or funnel-shaped; limb plicate, subentire. *Stamens* 5, included or exerted; filaments filiform; anthers ovate or oblong. *Ovary* 2- rarely 1-celled; ovules 4; styles 2, distinct from the base, each cleft into 2 linear or subclavate branches, stigmatic on the inner face. *Fruit* a 4-2-valved capsule. *Seeds* 4 or 2, rarely solitary, glabrous; cotyledons twice folded.

EVOLVULUS ALSINOIDES, Linn.; F. B. I. iv. 220.

All plains Districts, on open ground, by roadsides and in other dry grassy places, common.

A perennial herb with a woody root-stock and many spreading prostrate wiry branches, the flowers light blue, the leaves variable, lanceolate oblong ovate or even suborbicular, the hairiness also variable, in one form (*E. hirsutus*, Lamk.) fulvous-hirsute.

13. *Breweria*, R. Br.

Herbs or undershrubs or shrubs, erect or climbing. *Leaves* entire. *Flowers* in axillary peduncled heads or terminal close panicles or 1-3 together; bracts small. *Calyx* of 5 equal or unequal sepals, scarcely enlarged in fruit. *Corolla* campanulate or funnel-shaped; limb 5-plaited or shortly and broadly lobed. *Stamens* included; filaments filiform, often dilated at base. *Ovary* 2-celled; ovules 4; styles filiform, free from the base or united to about the middle and then equally or unequally 2-lobed; stigmas capitate. *Capsule* globose or ovoid, 4-valved, membranous or coriaceous. *Seeds* normally 4, often less, glabrous or nearly so.

Climbing shrub; leaves large, up to about 4 in. long, ovate-cordate, fulvous-tomentose; flowers large, in pedunculate rather stout cymes; styles united to nearly half their length.....1. *cordata*.
Erect rigid undershrub; leaves very small, under .5 in. long, oblong, nearly glabrous; flowers small, 1-3 together on slender pedicels or nearly sessile; styles distinct from the base.....2. *evolvuloides*.

1. *BREWERIA CORDATA*, Blume; F. B. I. iv. 223. *B. Roxburghii*, Wt. Ic. t. 1370.

N. Circars, forests of Godavari; W. Gháts, Anamalais and hills of Travancore.

A large densely pubescent or tomentose climber with white flowers.

2. *BREWERIA EVOLVULOIDES*, Choisy; F. B. I. iv. 224. *Seddera evolvuloides*, Wt. Ic. t. 1369.

Carnatic, coast region of Tinnevely and S. Travancore.

An erect branching undershrub, with small white, usually solitary, axillary flowers.

14. *Hewittia*, W. & A.

A pubescent twining herb. *Leaves* ovate, cordate, entire angled or lobed. *Flowers* axillary, solitary or in few-flowered cymes; bracts 2, below the calyx, linear-lanceolate. *Calyx* of 5 unequal large sepals, the 3 outer large, ovate, decurrent, enlarged in fruit, the 2 inner smaller, lanceolate, unaltered. *Corolla* widely campanulate, yellow or white with a purple eye, silky pubescent without; limb plicate. *Stamens* 5, included; filaments linear, dilated at the base; pollen-grains smooth. *Ovary* with long white silky erect hairs, 1- or imperfectly 2-celled; ovules 4; style filiform; stigma of 2 ovate-oblong lobes. *Fruit* a globose, 4-valved, 1-celled, normally 3-seeded capsule. *Seeds* black, glabrous.

HEWITTIA BICOLOR, W. & A.: F. B. I. iv. 216; Wt. Ill. t. 168, Ic. t. 835.
N. Circars, Godavari: W. Coast, Malabar and Cochin.

A climber with angled or palmately lobed leaves up to about 4 in. long, a conspicuous calyx and very thin-walled capsule.

15. *Aniseia*, Choisy.

Twining herbs. *Leaves* ovate or oblong, often mucronulate. *Flowers* axillary, solitary or in few-flowered cymes. *Calyx* of 5 herbaceous sepals, the 3 outer large ovate, decurrent on the peduncle, enlarged in fruit, the 2 inner lanceolate, not enlarged in fruit. *Corolla* widely tubular campanulate or funnel-shaped; limb subentire. *Stamens* 5, included; filaments filiform. *Ovary* 2-celled, 4-ovuled; style filiform, stigma 2-globose. *Fruit* a 2-celled, 4-valved capsule. *Seeds* 4, black, smooth.

ANISEIA UNIFLORA, Choisy; Wt. Ic. t. 850. *Ipomaea uniflora*, Roem. & Sch.; F. B. I. iv. 201.

E. Coast, near Negapatam (Wight); W. Coast, in Travancore, margins of tanks and backwaters.

A prostrate herb, with many fibrous roots from the stems rooting in mud. *Leaves* long-petioled, elliptic-oblong, often emarginate and mucronate at apex, cuncate at base, up to 3 in. long, 1 in. broad; corolla white; calyx-lobes greenish-white.

16. *Convolvulus*, Linn.

Herbs or undershrubs, erect prostrate or twining, sometimes spinescent. *Leaves* entire, toothed or lobed. *Flowers* axillary, solitary or in few-flowered cymes; bracts usually narrow. *Calyx* of 5 usually subequal sepals. *Corolla* campanulate or funnel-shaped; limb plicate, nearly entire. *Stamens* included; filaments usually unequal. *Ovary* 2-celled; ovules 4; style filiform; stigmas 2, linear or oblong, distinct. *Fruit* a globose capsule, 2-celled, 4-valved or breaking irregularly. *Seeds* normally 4, glabrous, smooth or minutely tuberculate.

Erect undershrub, silky-villous with tawny hairs; flowers 1—3 in a lax raceme; sepals ovate, acuminate; corolla tubular, under .5 in. long, villous on parts exposed in bud, shortly 5-lobed; leaves linear, narrow, up to 2 in. long

1. *Rotlerianus*.

Twining herbs:—

Glabrous or slightly pubescent; peduncles 1—3-flowered; sepals obtuse, nearly glabrous; corolla broadly funnel-shaped, about 1 in. broad; leaves linear- or triangular-oblong, hastate at base, up to 2 in. long.....2. *arvensis*.

More or less rusty-pubescent; peduncles 1—5-flowered, sepals acuminate, pubescent; corolla small, tubular-funnel-shaped, about .5 in. broad; leaves triangular-hastate or cordate, deeply lobed and toothed, up to 3 in. long, 1.5 in. broad.

3. *flavus*.

1. *CONVOLVULUS ROTTLEMANUS*, Choisy; F. B. I. iv. 219.

Deccan, in Western Districts, Bellary to Coimbatore, in dry grass lands.

A perennial, up to about 2—3 ft. high.

2. *CONVOLVULUS ARVENSIS*, Linn.; F. B. I. iv. 219.

Deccan and hills of W. Gháts, a weed of cultivation. Bindweed.

A trailing or twining herb with pink or white flowers.

3. *CONVOLVULUS FLAVUS*, Willd.; F. B. I. iv. 219. *C. rufescens*, Choisy; Wt. Ic. t. 1365.

W. Gháts, Nilgiris, hills of Coimbatore, Pulneys, at 3,000—6,000 ft.

A climbing plant with yellowish flowers.

17. *Jacquemontia*, Choisy.

Climbing herbs or undershrubs, usually pubescent. *Leaves* elliptic or cordate, entire or rarely toothed or lobed. *Flowers* in axillary compound umbellate or capitate cymes, rarely solitary; bracts small. *Calyx* of 5 equal or unequal sepals. *Corolla* small, tubular or funnel-shaped; limb plicate, the vertical bands ending in 2 distinct nerves. *Stamens* 5, included. *Ovary* glabrous, 2-celled; ovules 4; style filiform; stigmatic lobes 2, linear or elliptic-oblong. *Fruit* a globose 8-valved rarely 4-valved, 2-celled capsule. *Seeds* normally 4, glabrous or minutely rugose, sometimes slightly winged marginally.

JACQUEMONTIA PANICULATA, Hallier f. *Convolvulus parviflorus*, Vahl; F. B. I. iv. 220.

Most plains Districts and up to 3,000 ft. in the hills.

A slender climber with pink or white flowers, ovate or cordate long-acuminate leaves up to about 2.5 in. in diam., and globose capsules with 4 seeds which are trigonous, slightly winged, and often minutely rugose.

J. caerulea, Choisy, is a pretty blue-flowered climber, common in gardens in the plains. It is an introduction from S. America.

18. *Merremia*, Dennst.

Herbs or shrubs, usually climbing, sometimes erect or prostrate. *Leaves* alternate, entire or lobed. *Flowers* axillary, solitary or in cymes and usually with long peduncles. *Calyx* of 5 subequal sepals, various in shape. *Corolla* campanulate or funnel-shaped, usually white or yellow, the vertical bands defined by violet lines; limb plicate, the margin slightly lobed. *Stamens* 5, unequal, included or exerted; filaments filiform, often villous at the base; anthers usually twisted; pollen with longitudinal folds, not spinulose. *Ovary* 2—4-celled; ovules 4; style filiform; stigma 2-globose. *Fruit* a 4-valved capsule; 1—4-celled, the style sometimes separating with a small operculum. *Seeds* 4, dull, glabrous or rarely puberulous or with long hairs, cotyledons crumpled.

Corolla more or less hairy externally; seeds hairy:—

Seeds with long recurved spreading hairs; sepals .3 in. long; corolla villous near the apex, 1—1.5 in. long; cymes subumbellate; capsules globose; leaves ovate- or oblong-lanceolate, acute or acuminate, rounded or cordate or hastate at base, up to 3 in. long, 2 in. broad, glabrous or pubescent.....1. *umbellata*. Seeds minutely velvety, the margins almost villous; sepals .5—7 in. long; corolla densely shaggy without, 1.5—2 in. long; cymes subracemose; capsules ovoid; leaves broadly ovate, acute, truncate or sub-cordate at base, up to 4 in. in diam., glabrous.....2. *crispatula*.

Corolla glabrous externally:—

Corolla large, more than 1 in. long:—

Leaves palmately 5-lobed, occasionally 7-lobed, the lobes triangular-acuminate, the margins often dentate, more or less long-hairy, up to 6 in. in diam.; flowers in pedunculate cymes of 1—7; sepals .5—7.5 in. long, elliptic, obtuse; corolla yellow, 1—2 in. long.....3. *vitifolia*. Leaves digitate, leaflets 5, lanceolate, acuminate at both ends, subsessile, up to 4 in. long, 1.5 in. broad, hirsute; flowers in long-peduncled laxly dichotomous cymes with yellow strigose hairs; sepals .7 in. long, elliptic-oblong, unequal, enlarged in fruit and very strigose; corolla white, 1 in. long.....4. *aegyptia*. Leaves pedately 7-lobed, up to 8 in. in diam., the leaflets lanceolate, deeply and prominently toothed, glabrous; flowers large, in long-peduncled few-flowered cymes; sepals elliptic-ovate, acute, glabrous, 1 in. long, enlarged in fruit; corolla 1.5 in. long; seeds large, glabrous.....5. *dissecta*.

Corolla small, under 1 in. long:—

Sepals long-ciliate, the inner 3 larger and deeply emarginate, nearly .25 in. long, the outer 2 apiculate, shorter; corolla campanulate, .25 in. long; stems creeping and rooting at the nodes; leaves reniform or ovate-cordate, toothed, usually broader than long but under 1 in. in diam.....6. *emarginata*. Sepals not ciliate, the inner ones not emarginate; stems not rooting at the nodes:—

Flowers 1—3 together on axillary peduncles; seeds glabrous:—

Peduncles short, under 1 in. long; sepals elliptic, mucronate, glabrous; corolla campanulate, about .4 in. long; leaves variable, linear-hastate or oblong-obovate, the former usually acute, the latter obtuse and 3-toothed, all auricled at the base and toothed, up to 1 in. long.....7. *tridentata*. Peduncles long, often 3 in. long; sepals lanceolate acuminate, glabrous; corolla campanulate, .6—8 in. long; leaves linear-oblong, hastate and toothed at base on the auricles, acute and mucronate at apex, up to 3 in. long, .5 in. broad8. *hastata*.

Flowers in rather dense axillary dichasiod cymes; sepals truncate and cucullate, obtuse or apiculate, spreading later and then enlarged and often wrinkled; corolla campanulate, .35 in. long; leaves ovate, sometimes 3-lobed, entire or coarsely toothed, acute and apiculate, deeply cordate at base, up to 3 in. long; seeds pubescent.....9. *chryseides*.

1. MERREMIA UMBELLATA, Hallier f. *Ipomaea cymosa*, Roem. & Sch.; F. B. I. iv. 211.

N. Circars, E. Ghát Hills to the Godavari, up to 4,000 ft.; Deccan, Kambakam Hill in Chingleput (leaves hastate); W. Gháts, in all Districts up to 4,000 ft.

A very variable climber as regards hairiness and shape of leaves, the flowers white or cream-coloured.

2. MERREMIA CRISPATULA, Prain. *Ipomaea petaloidea*, Choisy; F. B. I. iv. 212.

N. Circars, in Godavari (Gamble).

A large climber with large leaves and yellow flowers.

3. MERREMIA VITIFOLIA, Hallier f. *Ipomaea vitifolia*, Sweet; F. B. I. iv. 213.

All plains Districts and up to 3,000 ft. in the hills, common.

- A perennial twining plant with yellow flowers, globose capsules and glabrous seeds, the stems and leaves with deciduous hairs.
4. *MERREMIA AEGYPTIA*, Urban. *Ipomaea pentaphylla*, Jacq. ; F. B. I. iv. 202. *Batatas pentaphylla*, Wt. Ic. t. 834.
N. Circars, Deccan, Carnatic and W. Coast, occasional.
An annual twining plant with white flowers, ovoid papery capsules and glabrous seeds.
5. *MERREMIA DISSECTA*, Hallier f. *Ipomaea sinuata*, Ortega ; F. B. I. iv. 214.
Deccan, Carnatic and W. Coast, in various places, a tropical American species now run wild.
A twining plant with glabrous or hirsute stems and pretty flowers, white or pink with a purple throat.
6. *MERREMIA EMARGINATA*, Hallier f. *Ipomaea reniformis*, Choisy ; F. B. I. iv. 206.
N. Circars, Deccan and Carnatic, up to 3,000 ft. in the hills, in damp places and on black cotton soil.
A creeping and rooting herb with yellow flowers and globose small capsule.
7. *MERREMIA TRIDENTATA*, Hallier f. *Ipomaea tridentata*, Roth ; F. B. I. iv. 205.
All plains Districts.
A perennial herb with thick rootstock giving off many elongate prostrate slender branches, the flowers pale yellow, the capsules globose.
8. *MERREMIA HASTATA*, Hallier f. *Ipomaea angustifolia*, C. B. Clarke ; F. B. I. iv. 205, *not of* Jacq.
East and West Coast Districts, apparently scarce inland.
A biennial twining herb with thick rootstock giving off slender branches, the flowers creamy-yellow or white, the capsules depressed-globose.
9. *MERREMIA CHRYSEIDES*, Hallier f. *Ipomaea chryseides*, Ker-Gawl. ; F. B. I. iv. 206 ; Wt. Ic. t. 157.
All plains Districts and up to 3,000 ft. in the hills, common.
A branched climbing herb, often with rough stems and variable leaves, the flowers yellow.

19. *Operculina*, Silva Manso.

Large climbing herbs, stems petioles and peduncles often winged. *Leaves* large, entire or lobed, rarely peltate. *Flowers* large, axillary, solitary or in few-flowered cymes ; bracts oblong, deciduous. *Calyx* of 5 large ovate glabrous sepals, enlarging and thickening in fruit, at length splitting irregularly from the tip. *Corolla* funnel-shaped, rarely campanulate, the tube with 5 vertical smooth bands. *Stamens* 5 ; filaments filiform, broadening at base ; anthers large, at length twisted. *Ovary* glabrous, 2-celled, 4-ovuled ; style filiform ; stigma 2-globose. *Fruit* a capsule, the epicarp circumscissile above the middle, the cap

carrying away the style, sometimes irregularly splitting. *Seeds* large, often solitary, black, smooth; radicle large.

OPERCULINA TURPETHUM, Silva Manso, Enum. Subst. Braz. 16, 49.
Ipomaea Turpethum, R. Br.; F. B. I. iv. 212.

N. Circars, common in Godavari; Deccan and Carnatic to S. Travancore, occasional.

A stout climber with white flowers and leaves very variable in shape, ovate or oblong, entire or lobed, truncate or cordate at base. In fruit the enlarged sepals and thickened pedicels are conspicuous.

20. *Erycibe*, Roxb.

Scandent or rambling shrubs, rarely trees. *Leaves* alternate, entire, coriaceous. *Flowers* small, in axillary or terminal racemose or paniced cymes; bracts small, lanceolate. *Calyx* 5-lobed, the lobes orbicular, coriaceous, appressed to the base of the fruit. *Corolla* white or yellowish, subrotate, the tube villous without; lobes 5, deeply obcordate and so seemingly 10, contorted in bud, margins entire or crenate. *Stamens* 5, on the corolla-throat; filaments short; anthers ovate-lanceolate. *Ovary* 1-celled, with 4 erect ovules; style 0; stigma subglobose, 5- or 10-ridged. *Fruit* an ovoid or ellipsoid fleshy berry. *Seed* solitary, glabrous; albumen scanty, irregularly intruded between the folds of fleshy plicate cotyledons; radicle large, inferior.

Corolla yellowish; leaves elliptic-oblong or obovate, abruptly sharply acuminate, base attenuate, up to 5 in. long, 2 in. broad, the petiole 3—5 in. long; cymes axillary or in terminal panicles; berry 5 in. long, ellipsoid.....1. *paniculata*. Corolla white; leaves elliptic or obovate, sometimes almost orbicular, sometimes even lanceolate, abruptly and usually obtusely acuminate, base cuneate or rounded, up to 4 in. long, 2 in. broad, the petiole 25 in. long; cymes axillary and elongate or in terminal panicles; berry 5 in. long, ovoid.....2. *Wightiana*.

1. *ERYCIBE PANICULATA*, Roxb. Cor. Pl. t. 159; F. B. I. iv. 180; Wt. Ill. t. 180.

N. Circars, hills of Ganjam to Godavari, in forest ravines at low levels; occasional in Mysore and Malabar.

A large climbing shrub, the branches, inflorescence and young leaves with much rusty tomentum, the leaves dull above and not strongly reticulate beneath. Bark brown with large corky lenticels; wood soft, porous, of peculiar structure. Vern. *Ur. Katapergu*.

2. *ERYCIBE WIGHTIANA*, Grah.: Hallier f. Bull. Herb. Boiss. v. 737. *E. paniculata*, Roxb. var. *Wightiana*, C. B. Clarke; F. B. I. iv. 181. W. Coast and W. Ghâts, from S. Canara and Mysore southwards, up to about 4,000 ft.

A large climbing shrub, rusty-tomentose like the preceding, the flowers very fragrant, the leaves shining above, prominently reticulate beneath.

21. *Cuscuta*, Linn.

Leafless twining parasitic herbs, yellow or reddish. *Flowers* small, white or rose coloured, sessile or shortly pedicelled, solitary or in lateral

fascicles or short racemes; bracts small or 0. *Calyx* of 5 (or 4) subequal sepals, free or connate at the base. *Corolla* ovoid globose or campanulate, usually with a ring of fimbriate or lobed scales near the base or below the stamens, sometimes wanting; lobes 5 (or 4) short, imbricate. *Stamens* as many as the corolla lobes, inserted on or below the throat of the corolla; filaments linear; anthers oblong, exsert. *Ovary* more or less completely 2-celled; ovules 4; styles 1 or 2; stigmas 2. *Fruit* a globose or ovoid, dry or succulent capsule, circumscissile or irregularly breaking up; seeds 4—2. *Seeds* glabrous, albumen fleshy; embryo slender, spiral, the cotyledons obscure.

Style 1, short, stout, stigmas 2, ovoid, acute, diverging; branches stout, fleshy; scales at the base of the corolla; capsule succulent.....1. *reflexa*.
Styles 2, distinct, elongate, stigmas capitate; branches filiform; capsule dry, papery:—

Scales on the corolla-tube 0; sepals ovate-acuminate; corolla-lobes long-acuminate; seeds with few minute lines.....2. *hyalina*.
 Scales on the corolla-tube below the stamens fimbriate; sepals deltoid; corolla lobes shortly acuminate; seeds very minutely rugose.....3. *chinensis*.

1. *CUSCUTA REFLEXA*, Roxb. Cor. Pl. t. 104; F. B. I. iv. 225.

All plains Districts and up to 6,000 ft. in the hills of the Nilgiris and Pulneys.

A stout-branched, yellow, much intertwining plant, parasitic on many species of shrubs or trees and sometimes almost completely covering them.

2. *CUSCUTA HYALINA*, Roth. F. B. I. iv. 226; *C. arabica*, Wt. Ic. t. 1371. Deccan and Carnatic.

A very slender-stemmed parasite, recorded as growing on *Amaranthus*, *Polygonum*, *Tribulus*, *Trianthema*, etc.

3. *CUSCUTA CHINENSIS*, Lamk.; F. B. I. iv. 226; Wt. Ic. t. 1373. *C. hyalina*, Wt. Ic. t. 1372, not of Roth.

Carnatic.

A very slender-stemmed parasite, found on *Ipomaea Pescaprae* and other plants, but apparently scarce.

Family CVI. SOLANACEAE.

Herbs or shrubs erect or climbing or rarely small trees. *Leaves* alternate, often in unequal pairs, rarely clustered, never truly opposite, entire lobed or pinnatifid; stipules 0. *Flowers* regular, hermaphrodite or rarely dioecious, in terminal or lateral axillary or extra-axillary cymes or on solitary or clustered pedicels; bracts and bracteoles 0. *Calyx* inferior, limb usually 5-lobed or -toothed, usually persistent, often accrescent in fruit. *Corolla* funnel-shaped campanulate or rotate, often plicate; lobes 5, rarely 10 or the limb subentire. *Stamens* 5, on the corolla-tube; anthers ovate or oblong, dehiscing by apical pores or longitudinally. *Ovary* 2-celled or imperfectly 1- or 4-celled, rarely 3—5-celled; ovules many, on prominent peltate placentas; style linear; stigma capitate or very shortly lobed. *Fruit* a berry or a circumsciss or valvate capsule, usually 2-celled, many-seeded. *Seeds* compressed discoid or subreniform; testa usually crustaceous; albumen fleshy; embryo peripheric with linear cotyledons or rarely straight.

Fruit indehiscent, a berry:—

 Anthers connivent in a cone, longer than the filaments:—

 Anthers dehiscing by apical pores or short slits; leaves entire lobed or pinnatifid

1. *Solanum*.

 Anthers dehiscing introrsely by longitudinal slits, the tips empty; leaves pinnatisect..... *Lycopersicum*.

 Anthers not connivent in a cone, not longer than the filaments, dehiscing by lateral slits:—

 Calyx in fruit small, the flowers solitary or in pairs..... *Capsicum*.

 Calyx in fruit enlarged, overtopping the berry:—

 Pedicels solitary; corolla broadly campanulate, the lobes plicate in bud; leaves pubescent or glabrous:—

 Calyx in fruit inflated, shortly lobed.....2. *Physalis*.

 Calyx in fruit deeply cleft, much enlarged, 5-angled..... *Nicandra*.

 Pedicels clustered; corolla narrowly campanulate, the lobes valvate in bud; leaves and stems stellate-tomentose.....3. *Withania*.

Fruit capsular:—

 Flowers axillary, solitary; corolla-lobes plicate; embryo curved.....4. *Datura*.

 Flowers in terminal panicles; corolla-lobes induplicate-valvate; embryo straight..... *Nicotiana*.

1. *Solanum*, Linn.

Herbs or shrubs, sometimes subscandent, rarely small trees, unarmed or prickly. *Leaves* alternate or subopposite, entire lobed or pinnatifid. *Flowers* in dichotomous or racemose, lateral or terminal cymes. *Calyx* 5—10-lobed, rarely 4-lobed or subentire, accrescent or not in fruit. *Corolla* rotate, rarely campanulate: tube short; limb plicate, usually 5-lobed. *Stamens* 5, rarely 4 or 6, attached to the throat of the corolla; filaments short; anthers oblong, often narrowed upwards, connivent in a cone, opening by terminal pores or short slits. *Ovary* 2-, rarely 3—4-celled; style columnar; stigma small. *Fruit* a globose or elongated berry. *Seeds* very many, small, usually discoid; testa crustaceous, often pitted; albumen fleshy; embryo peripheric, the cotyledons linear, radicle terete.

Unarmed:—

 Roots mixed with tubers; stems herbaceous, faintly angular; leaves pinnatifid; flowers large, blue or white..... *tuberosum*.

 Roots not mixed with tubers:—

 Annual herb; flowers white, in axillary or lateral umbellate cymes; leaves thin, glabrous, ovate-lanceolate, acute or acuminate, entire or sinuate-toothed; berry globose, .25 in. in diam., black but sometimes red or yellow, shining; seeds discoid, minutely pitted.....1. *nigrum*.

 Perennial shrubs or undershrubs:—

 Densely stellately tomentose; flowers in lateral or axillary though often apparently terminal cymes:—

 Flower cymes corymbose, corolla white; calyx cup-shaped, .25 in. long, lobes short, deltoid; leaves velvety-tomentose, tawny beneath, elliptic-lanceolate, acuminate, up to 10 in. long, 5 in. broad, entire; berry yellow, globose, with few stellate hairs, .3 in. in diam.; seeds minutely papillose-scaly.....2. *verbascofolium*.

 Flower cymes racemose, corolla purple; calyx .2 in. long, deeply lobed, lobes lanceolate, acuminate; leaves rather sparsely stellate-tomentose, ovate, subacute, rhomboid or slightly cordate at base, up to 4 in. long, 2.5 in. broad, entire or sinuately lobed; berry red, glabrous, globose, shining, .3 in. in diam.; seeds scaly.....3. *pubescens*.

 Sparsely stellately pubescent or glabrous or pilose; corolla white:—

 Flowers in extra-axillary pedunculate racemose cymes; calyx-lobes linear-lanceolate, acuminate, stellate-pubescent, .15—2 in. long; corolla deeply lobed, the lobes oblong, .35 in. long, recurved; leaves elliptic-lanceolate,

acute at both ends, repand-sinuate, long-petioled, up to 5 in. long, 2 in. broad; seeds flat, 1.5—2 in. long, slightly scaly.....4. *ragum*.
Flowers axillary, solitary or in sessile umbels, seeds angular, reticulately pitted; leaves with usually unequal pairs:—

Calyx glabrous or nearly so, entire or with reflexed protuberances outside the margin or with 5 subulate teeth, saucer-shaped in fruit; branchlets usually quadrangular, often zigzag; leaves membranous, elliptic-lanceolate, long-acuminate, up to 9 in. long, 3 in. broad, slightly setose above or glabrous; berries yellow or red.....5. *larue*.
Calyx pilose with 5—10 short teeth, which are usually reflexed in fruit; branchlets usually round, sometimes zigzag; leaves membranous, elliptic-lanceolate, acuminate, up to 6 in. long, 2 in. broad, very pilose when young, sparsely so when old, often with few prominent acute teeth on the upper half; berries red.6. *denticulatum*.

Armed with prickles:—

Erect herbs, shrubs or small trees:—

Leaves entire, nor prickly, prickles only on the stem; leaves oblong, oblanceolate, abruptly acuminate, up to 12 in. long, 4 in. broad, glabrous above when mature, densely white-stellate-tomentose beneath; flowers in dense stellately-woolly lateral or subterminal corymbose cymes; calyx-lobes triangular; corolla pale blue-purple, small, .3 in. long; berry glabrous, .3 in. in diam.; seeds flat, minutely dotted.....7. *giganteum*.

Leaves sinuately or pinnatifidly lobed:

Lobes shallow, few:—

Corollas over 2 in. in diam., blue, the flowers in axillary umbels of 1—3 on very short peduncles, the long pedicels deflexed in fruit; stamens unequal (3 long, 2 short); leaves ovate, acute at apex, cordate at base, softly tawny pubescent, up to 4 in. long, 2 in. wide; prickles on stems, petioles and leaves few and small; berry globose, enclosed in accrescent calyx; seeds flat, reticulate.....8. *Wightii*.
Corollas under 2 in. in diam., the flowers in axillary or lateral racemes or corymbose cymes:—

Flowers white; calyx not enlarging in fruit; berry globose; style glabrous; seeds small, flat, nearly smooth:—

Berry large, 1—1.5 in. in diam., densely covered with yellowish needle-like hairs; cymes few-flowered; corolla .75 in. in diam., densely stellate-strigose without; leaves ovate or subrectangular in outline with large triangular lobes, densely fulvous stellately woolly, up to 18 in. long, 12 in. broad; prickles many, on stems, petioles and leaf-neres

9. *ferox*.

Berry small, .3 in. in diam., smooth; cymes corymbose, many-flowered; corolla .75 in. in diam., stellate-pubescent without; leaves ovate or subrectangular in outline, acute, often cordate at base, with few large triangular lobes, softly fulvous-tomentose, up to 9 in. long, 7 in. broad; prickles very few, on stem and petioles only.....10. *torvum*.

Flowers blue; berry smooth; corolla sparsely pubescent; style stellately villous; seeds minutely pitted:—

Racemes few-flowered; calyx-lobes lanceolate, enlarging in fruit, in wild forms often prickly; leaves ovate, few-sinuate, unequal and acute or subcordate at base, up to 6 in. long, 4 in. broad in cultivated, 4 in. long, 2 in. broad in wild forms, softly stellately-pubescent; prickles few in cultivated, many in wild form, on stem, leaves and calyx.....11. *Melongena*.

Racemes many-flowered; calyx-lobes triangular, often prickly, not enlarging in fruit; leaves variable, normally few-sinuate lobed but sometimes deeply lobed or pinnatifid, stellately woolly beneath, usually less so above, up to 6 in. long, 4 in. broad; prickles many, stout, curved, on stem and leaves; berry globose, .3 in. in diam.

12. *indicum*.

Lobes deep, many:—

Calyx-tube inflated in fruit, deeply cup-shaped, ultimately reflexed; flowers racemose, white or pale blue; leaves oblong-lanceolate in outline, deeply pinnatifid or twice pinnatifid, up to 8 in. long, 4 in. broad, softly

stellate-pubescent; prickles very numerous, yellowish, straight and sharp, on stem, leaves and calyx; berry globose, 1 in. in diam., yellow, smooth; seeds large, pitted.....13. *sisymbriifolium*. Calyx-lobes not or only slightly inflated in fruit, ovate or lanceolate, abruptly acute; flowers in few-flowered cymes, blue-purple; leaves ovate or elliptic, acute, pinnatifid half-way down, sometimes only sinuate, up to 4 in. long, 2 in. broad, sparsely stellate-pubescent to nearly glabrous; prickles very numerous, yellow, straight, often .5 in. long, on stems, leaves and calyx; berry globose, yellow or white with green blotches, .5—75 in. in diam.; seeds small, smooth.....14. *xanthocarpum*.

Climbing undershrubs, the stems with very numerous short strong recurved prickles; leaves ovate in outline, sinuate or 3—5-lobed, obtuse, truncate or subcordate at base, up to 3 in. long, 1.5 in. broad, nearly glabrous; cymes lateral with short peduncles and long pedicels, about 2—8-flowered; calyx-lobes ovate, acuminate, prickly; corolla large, white to purple; berry globose, scarlet, smooth, .3 in. in diam.; seeds flat, slightly pitted.....15. *trilobatum*.

1. *SOLANUM NIGRUM*, Linn.; F. B. I. iv. 229. *S. rubrum*, Roxb.; Wt. Ic. t. 344.
All Districts and at all elevations, a cosmopolitan weed of roadsides and cultivated land.
An erect annual herb.
2. *SOLANUM VERBASCIFOLIUM*, Linn.; F. B. I. iv. 230; Wt. Ic. t. 1398.
All Forest Districts, usually in ravines or shady places under big trees.
A large shrub or small tree up to 20 ft. high. Bark grey, smooth; wood soft, light yellow.
3. *SOLANUM PUBESCENS*, Willd.; F. B. I. iv. 230; Wt. Ic. t. 1402.
Deccan and Carnatic to the E. slopes of the W. Gháts in open scrub forest on arid soil, up to 3,000 ft.
A usually low, but occasionally large, shrub, up to 6 ft. high (15 ft. or more, *Wight*); the flowers in loose racemes.
4. *SOLANUM VAGUM*, Heyne; F. B. I. iv. 230.
W. Gháts, hills of Tinnevely, probably at 4,000—6,000 ft.
A glabrescent shrub with white flowers.
5. *SOLANUM LAEVE*, Dunal; F. B. I. iv. 231. *S. bigeminatum*, Nees; F. B. I. iv. 231.
N. Circars, Madgol Hills of Vizagapatam at 3,000 ft. (A. W. Lushington); W. Gháts, in all Districts in evergreen forests, up to 6,000 ft.
A straggling undershrub with variable calyx-teeth, always, however, saucer-shaped in fruit.
6. *SOLANUM DENTICULATUM*, Blume; F. B. I. iv. 231; Wt. Ic. t. 1397.
Hills of the Carnatic; W. Gháts, in Nilgiris and Pulneys up to 7,000 ft., chiefly in moist places.
A shrub reaching 6 ft. in height but weak and scarcely woody. The leaves have sometimes prominent angular lobes (var. *Gouakai*, C. B. Clarke).
7. *SOLANUM GIGANTEUM*, Jacq.; F. B. I. iv. 233; Wt. Ic. t. 893.
N. Circars, hills of Vizagapatam to 4,000 ft. (A. W. Lushington); Deccan, in hilly country of Mysore and Coimbatore, to 5,000 ft.; W. Gháts, in almost all Districts, above 4,000 ft.
A large shrub or small tree, reaching a height of even 25 ft., easily known by the dense white stellate tomentum covering the

- whole plant except the upper surface of the leaves, the stem prickles conical, quite small. The berries are red.
8. *SOLANUM WIGHTII*, Nces; F. B. I. iv. 234; Wt. Ic. t. 841.
W. Gháts, E. side of Nilgiris at 4,000–6,000 ft.; hills of Coimbatore at 4,500 ft. (Fischer).
An erect herbaceous plant with handsome large blue flowers with angular lobes, the calyx-lobes lanceolate.
 9. *SOLANUM FEROX*, Linn.; F. B. I. iv. 233; Wt. Ic. t. 1399 (var. *majus*).
W. Gháts, in most Districts, up to 4,000 ft., but not very common.
A stout straggling herbaceous plant up to 10 ft. high with very woolly stems and leaves and large orange hispid fruit. The leaves are often very large.
 10. *SOLANUM TORVUM*, Swartz; F. B. I. iv. 234; Wt. Ic. t. 345.
Almost all Districts, in the hills up to about 3,000 ft., in waste places and by roadsides, common.
A shrub reaching about 12 ft. in height, very variable in shape and lobes of leaf according to climate and soil. Berries yellow, shining.
 11. *SOLANUM MELONGENA*, Linn.; F. B. I. iv. 235; Wt. Ill. t. 166.
All Districts, usually in cultivation. The Egg-plant. Vern. *Hind.* Baigun, brinjal.
A well-known vegetable, the fruits often very large and purple.
Var. *insanum*, Prain. *Solanum insanum*, Willd.
All Districts, in waste places and by roadsides, a wild form.
A very prickly herb with smaller and more grey-pubescent stems and leaves and a globose yellow fruit under 1 in. in diam.
 12. *SOLANUM INDICUM*, Linn.; F. B. I. iv. 234; Wt. Ic. t. 346.
All Districts in the plains and the lower hills, chiefly by roadsides, on rubbish heaps and in similar places.
A branching very prickly undershrub reaching 5 ft. in height, very variable in pubescence, size and shape of leaf and length of raceme. The berries are dark yellow. Vern. *Hind.* Barhanta.
Var. *multiflora*, C. B. Clarke. *S. ferox* var. *minus*, Wt. Ic. t. 1400.
A large form with very stellate-tomentose leaves and long racemes with many flowers recurved in fruit. The berries are yellow, rather small and shining and long.
W. Gháts, Nilgiri and Pulney Hills, about 6,000–7,000 ft.
 13. *SOLANUM SISYMBRIIFOLIUM*, Lam.
W. Gháts, Nilgiris and Pulneys, at 5,000–7,000 ft.; hills of Coimbatore. A S. American plant now run wild in many places in India.
A viscid undershrub, the large flowers often 1–1·5 in. in diam. in lateral racemes.
 14. *SOLANUM XANTHOCARPUM*, Schrad. & Wendl.; F. B. I. iv. 236. *S. Jacquinii*, Willd.; Wt. Ic. t. 1401.
All Districts in the plains and low hills, a weed of roadsides and waste land.
A diffuse perennial conspicuous herb, the flowers often 75 in. in diam.

15. *SOLANUM TRILOBATUM*, Linn.; F. B. I. iv. 236; Wt. Ic. t. 854.
N. Circars, Deccan and Carnatic, especially near the coast.
A very prickly trailing or climbing undershrub.

SOLANUM TUBEROSUM, Linn., is the Potato, Vern. *Hind.* Alu, introduced from America and largely cultivated in the hills. Besides it and *S. Melongena*, the Brinjal, several species of the genus are cultivated in gardens and some are found run wild. *S. robustum*, Wendl., a large species resembling *S. ferox* but with the stems winged by the decurrent leaf-bases, is found about Coonoor in the Nilgiris. It is a S. American species and has leaves and stems covered with dense golden tomentum. *S. aculeatissimum*, Jacq., is a very prickly Malay species found apparently run wild about Quilon in Travancore. *S. Wrightii*, Benth., is a Mexican shrub with large handsome purple flowers frequently found in gardens.

2. *Physalis*, Linn.

Annual or perennial herbs. *Leaves* alternate, entire sinuate or shortly lobed. *Flowers* solitary, axillary, pedicelled. *Calyx* campanulate, 5-fid, in fruit accrescent, then inflated, membranous, loosely enclosing the berry; teeth small, connivent. *Corolla* campanulate, lurid yellow, often with purple spots near the base. *Stamens* 5, attached near the base of the corolla; anthers oblong, shorter than the filaments, dehiscing longitudinally. *Ovary* 2-celled; ovules numerous; style linear; stigma obscurely 2-lobed. *Fruit* a globose berry, enveloped in the bladder-like calyx. *Seeds* many or few, compressed, smooth or rugose; embryo peripheric.

Corolla .5 in. across or more, with 5 purple spots near the base within; calyx more than 1 in. long, ovoid-conical; leaves ovate, sinuate or angular, usually entire, pubescent, up to 3 in. long, 2 in. broad; berry orange-yellow.....1. *peruviana*.
Corolla under .25 in. across, sometimes spotted; calyx under 1 in. long, ovoid or subglobose; leaves ovate, acute, sinuate or toothed, pubescent or nearly glabrous, up to 2.5 in. long, 1.5 in. broad; berry small, yellow.....2. *minima*.

1. *PHYSALIS PERUVIANA*, Linn.; F. B. I. iv. 238.
Hills of the Deccan and Carnatic, Bababudans, Shevaroyes, Kollimalais and Sirumalais; W. Gháts, Nilgiris and Pulneys, usually at 5,000—7,000 ft., in undergrowth of forests, especially plantations; introduced from America and run wild, often cultivated. Cape Gooseberry. Vern. *Hind.* Tipari.
2. *PHYSALIS MINIMA*, Linn.; F. B. I. iv. 238.
All Districts, a common weed of undergrowth, roadsides and waste places.
A herbaceous annual. The glabrous form with angular fruiting calyx is var. *indica*, C. B. Clarke. *P. angulata*, Linn., seems to differ very little from it. It is only a weed of cultivated ground.

3. *Withania*, Pauq.

Unarmed shrubs, often hoary-tomentose. *Leaves* alternate, entire. *Flowers* axillary, sometimes polygamo-dioecious, fascicled or solitary, sessile or shortly pedicelled. *Calyx* campanulate, 5—6-toothed, accrescent and subglobose in fruit. *Corolla* campanulate; lobes 3—6, short,

valvate in bud. *Stamens* 5, attached near the base of the corolla; anthers dehiscing longitudinally. *Ovary* 2-celled, ovules many; style linear; stigma shortly bifid. *Fruit* a globose berry, enclosed in the enlarged calyx. *Seeds* very many, discoid, testa pitted; embryo peripheric.

WITHANIA SOMNIFERA, Dun.; F. B. I. iv. 239; Wt. Ic. t. 853.

Deccan, Ceded Districts Mysore and Coimbatore, in dry localities; occasional in E. Carnatic.

An erect branching undershrub reaching 5 ft. in height, all parts minutely stellate-tomentose. Leaves broadly ovate, up to 4 in. long and little less in breadth; flowers in axillary fascicles. The seeds are sometimes used as rennet. Vern. *Hind.* Asgánd; *Tel.* Pennerugadda; *Tam.* Amkulang.

4. *Datura*, Linn.

Coarse rank shrubby herbs. *Leaves* large, entire, sinuate or deeply toothed. *Flowers* large, purple or white, solitary, erect or pendulous. *Calyx* long-tubular, herbaceous, 5-lobed, in fruit the upper part deciduous leaving the circumsciss base. *Corolla* long-tubular, funnel-shaped, the mouth wide; limb plaited, entirely or shortly 5- or 10-lobed. *Stamens* 5, attached near the base of the tube; filaments filiform; anthers included, linear, longitudinally dehiscing. *Ovary* 2- or spuriously 4-celled; style filiform; stigma 2-lobed. *Fruit* an ellipsoid spinescent 4-celled capsule, 4-valved or irregularly bursting near the apex. *Seeds* very many, compressed, rugose; embryo peripheric.

Capsule opening irregularly near the apex:—

Capsule covered with short spines or blunt tubercles; flowers white or white with purple outside; leaves ovate, acute, entire or coarsely toothed, with acute lobes, base very unequal-sided, up to 8 in. long, nearly glabrous.....1. *fastuosa*. Capsule covered with long slender spines; flowers white tinged with green; the fruiting calyx very large; leaves ovate-lanceolate, acute, base very unequal, up to about 4 in. long or more, minutely grey-tomentose.....*Metel*. Capsule deeply 4-valved, erect; flowers white; leaves ovate, many-toothed or sinuate, up to about 7 in. long.....*Stramonium*.

DATURA FASTUOSA, Linn.; F. B. I. iv. 242; Wt. Ic. t. 1396.

Almost all Districts, in gardens and on waste land and roadsides, apparently wild.

A large annual somewhat succulent herb with often zigzag stems, soft leaves and subglobose capsules seated on the short persistent saucer-like calyx base. Flowers usually white but purple outside and frequently double. Vern. *Hind.* Dhatura.

Var. *alba*, C. B. Clarke, similar but with the flowers white, not often double, the capsule spines sharper. Same distribution.

D. Metel, Linn.; F. B. I. iv. 243, said to be the most poisonous species, is found about Madras and is at once recognized by the tomentum, the large persistent calyx and the sharp capsule-spines. *D. Stramonium*, Linn.; F. B. I. iv. 242; Wt. Ic. t. 852, is the Thorn Apple, occasionally found in the Hill country. The large shrubby species with beautiful white flowers so commonly found in gardens in the Hills is *D. arborea*, Linn., and the one with orange-scarlet flowers is *D. sanguinea*, Ruiz. & Pav. They were both introduced from S. America.

Lycopersicum esculentum, Mill., is the Tomato, commonly cultivated and occasionally found run wild.

Capsicum annuum, Linn., and *Capsicum frutescens*, Linn., are the plants which are cultivated so extensively as Chillies. They both were originally introduced from S. America and the latter species is now frequently found run wild. For the most usual varieties see Prain, 'Bengal Plants,' p. 747 (old edn.), and Cooke, 'Fl. Bomb.,' ii. 276 (old edn.).

Nicandra physaloides, Gaertn., is a S. American plant, sometimes cultivated but often found run wild or as a weed in gardens in the Hills. It has pretty blue flowers and a dry berry enclosed in the much enlarged heart-shaped calyx-lobes.

Nicotiana Tabacum, Linn., is the Tobacco plant, cultivated in most Districts but especially in Godavari, Kistna, Guntur and Coimbatore. The Family also contains several genera, such as *Browallia*, *Brunfelsia*, *Cestrum* and *Petunia*, affording well-known garden ornamental plants. *Cyphomandra betacea*, Sendt., is the Tree Tomato, a S. American shrub cultivated for its fruit, excellent for stewing and tarts.

Family CVII. SCROPHULARIACEAE.

Herbs or shrubs, rarely trees, often semi-parasitic. *Leaves* all or the lower only opposite, rarely all alternate or whorled; stipules 0. *Flowers* hermaphrodite, usually irregular; inflorescence centripetal or composite. *Calyx* inferior, usually persistent; lobes 5, rarely 4. *Corolla* hypogynous, more or less 2-lipped or sometimes personate, 4—5-lobed. *Stamens* usually 4, didynamous or subequal, with or without a staminode, rarely 5 or only 2; anthers various, 1- or 2-celled, the cells distinct or more or less confluent, sometimes imperfect. *Disk* annular cupular or glandular. *Ovary* 2-celled; ovules many, rarely few, in each cell; style simple; stigma capitate dilated, 2-lobed or 2-lamellate. *Fruit* a capsule, rarely a berry; placentas on a free central axis or attached to the margins of the valves. *Seeds* small, various in shape; albumen fleshy, rarely 0; embryo straight or curved.

Leaves all alternate; corolla subrotate, the tube short; large erect herbs:—

Stamens 5.....1. *Verbascum*.

Stamens 4.....2. *Celsia*.

Leaves, at least the lower, if not all, opposite; corolla-tube usually elongate:—

Corolla spurred in front at the base; capsule opening by pores.....3. *Linaria*.

Corolla not spurred in front at the base; capsule opening by valves:—

Corolla-lobes subequal; anthers 1-celled; capsule septicidal.....4. *Sutera*.

Corolla distinctly bilabiate:—

Stamens 4, included within the corolla-tube:—

Corolla-throat 2-lobed on the palate; anther-cells divaricate:—

Calyx 5-angled and 5-toothed; anther-cells confluent at the apex; leaves all opposite.....5. *Mimulus*.

Calyx widely campanulate with 5 leafy lobes; anther-cells distinct; lower leaves opposite, upper alternate.....6. *Mazus*.

Corolla-throat not lobed on the palate; anther-cells distinct:—

Calyx widely campanulate; corolla-palate with two folds; anther-cells stipitate; capsule loculicidal.....7. *Lindenbergia*.

Calyx 5-partite; corolla-palate without folds; capsule both loculicidal and septicidal:—

Anther-cells stipitate:—

Stamens 4, 2 or all with one anther-cell imperfect; uppermost lobe of calyx much the largest.....8. *Adenosma*.

- Stamens with all cells perfect:—
 Placentas separating in fruit or if joined in a column not winged;
 seeds terete.....9. *Stemodia*.
 Placentas joined in a column winged by the remains of the
 septa; seeds angular.....10. *Limnophila*.
 Anther-cells contiguous, not stipitate; three lobes of the calyx larger
 than the other two, which are very narrow.....11. *Moniera*.
 Stamens 2 perfect, the anterior pair reduced to staminodes, all inserted in
 the corolla-tube.....12. *Dopatrium*.
 Stamens, if 4 the anterior (lower) pair, if 2 the staminodes, attached to
 the corolla-throat, the posterior or only perfect pair inserted within the
 corolla-tube; capsule septicidal:—
 Stamens 4, all perfect:—
 Calyx-lobes broad; stout erect herbs.....13. *Artanema*.
 Calyx-lobes narrow; slender herbs, erect or trailing:—
 Calyx winged or keeled, mouth oblique.....14. *Torenia*.
 Calyx-lobes equal, not winged or keeled.....15. *Vandellia*.
 Two upper stamens only perfect, the lower pair reduced to staminodes
 16. *Ilysanthes*.
 Corolla small, almost or quite uniform with subequal lobes; lower stamens
 perfect, upper 0 or reduced to staminodes:—
 Calyx tubular, 5-lobed; leaves opposite:—
 Anther-cells confluent; leaves narrow.....17. *Microcarpaea*.
 Anthers 1-celled; leaves broad, fleshy.....18. *Peplidium*.
 Calyx campanulate, 3—4-lobed; anther cells confluent at the tips; minute
 herbs with fascicled leaves.....19. *Glossostigma*.
 Corolla-lobes flat, spreading:—
 Corolla-lobes subequal, the throat bearded; stamens 4; capsule globose,
 septicidal.....20. *Scoparia*.
 Corolla-lobes subequal, the 2 lateral the wider; stamens 2; capsule com-
 pressed, usually loculicidal.....21. *Veronica*.
 Corolla-tube elongate, the lobes spreading; stamens 4, didynamous, the anther-
 cells distinct, equal or one imperfect or wanting; semi-parasitic herbs:—
 Calyx tubular, ribbed, 5-lobed:—
 Corolla-tube straight or nearly so, the lobes subequal.....22. *Buchnera*.
 Corolla-tube abruptly incurved near the middle, the 2 upper lobes the
 smaller.....23. *Striga*.
 Corolla-tube broad; calyx campanulate, oblique; anthers 2-celled
 24. *Alectra*.
 Corolla-tube straight or curved; anthers 1-celled.....25. *Rhamphicarpa*.
 Corolla-tube straight; anthers 2-celled:—
 Anthers with one cell imperfect.....26. *Sopubia*.
 Anthers 2-celled, the cells subequal, both perfect.....27. *Micrargeria*.
 Calyx spathaceous, split down the front:—
 Corolla-lobes subequal, broad, spreading; anthers 2-celled, one cell often
 imperfect.....28. *Centranthera*.
 Corolla strongly 2-lipped, the upper lip erect, hooded; anther-cells both
 perfect.....29. *Pedicularis*.

1. *Verbascum*, Linn.

Erect, tomentose or woolly, usually tall and biennial or perennial herbs. *Leaves* alternate, entire, sinuate or pinnatifid. *Flowers* usually yellow, rarely purple red or white, in simple or paniced terminal bracteate racemes or spikes. *Calyx* 5-lobed, usually deeply, the lobes imbricate. *Corolla* rotate; lobes 5, the two posterior ones outside in bud. *Stamens* 5; filaments all or the 3 upper bearded; anthers transverse or oblique, the cells confluent. *Ovary* rounded; style dilated towards the stigmatose apex. *Fruit* a globose oblong or ovoid septicidal capsule, the valves separating from the axis. *Seeds* many, rugose; embryo straight.

Viscid pubescent herbs; leaves oblong-lanceolate or oblanceolate, the upper coarsely dentate, cordate and amplexicaul at base, the lower almost pinnatifid and auricled; flowers bright yellow, purple at base, the filaments with purple woolly hairs.1. *virgatum*.
 Stellately grey-tomentose herbs; leaves lanceolate-acuminate, decurrent along the stem at base, entire or slightly crenate; flowers yellow in a densely woolly spike; 3 of the filaments with white hairs, 2 longer glabrous.....2. *Thapsus*.

1. *VERBASCUM VIRGATUM*, With.; F. B. I. iv. 250; Wt. Ic. t. 1404—5.
 W. Ghâts, Nilgiris and Pulneys, at high levels, introduced from Europe and run wild.
 A tall erect herb, reaching sometimes 6 ft. in height.
2. *VERBASCUM THAPSUS*, Linn.; F. B. I. iv. 250.
 W. Ghâts, Nilgiri Hills, about Ootacamund, introduced from Europe or N. India and now rapidly spreading (Bourne).
 A tall handsome and conspicuous woolly herb, reaching to about 3 ft. in height.

2. *Celsia*, Linn.

Annual or biennial erect herbs. *Leaves* alternate, crenate sinuate dentate or pinnatifid. *Flowers* in terminal bracteate spikes or racemes, rarely branched. *Calyx* deeply 5-lobed. *Corolla* rotate, tube almost none; lobes 5, broad, somewhat unequal, the upper outermost in bud. *Stamens* 4, didynamous or subequal; filaments bearded; anthers transverse or oblique, with confluent tips. *Ovary* ovoid or globose, ovules many; style entire; stigma compressed, terminal. *Fruit* a globose or ovoid septicidal capsule; valves 2, each usually bifid. *Seeds* many, very small, transversely rugose.

CELSIA COROMANDELIANA, Vahl; F. B. I. 251; Wt. Ic. t. 1406.

All plains Districts, chiefly as a weed on cultivated lands.

An erect, grey-pubescent annual with yellow flowers in a branching racemose inflorescence, the leaves lyrate-pinnatifid at base, gradually smaller up the stem.

3. *Linaria*, Juss.

Herbs. *Leaves* usually opposite or whorled below, alternate above. *Flowers* axillary, solitary or passing into terminal racemes or spikes with the floral leaves reduced to bracts; pedicels slender. *Calyx* 5-partite; lobes imbricate. *Corolla* 2-lipped and personate, the upper lip erect, 2-lobed, the lower spreading, 3-lobed, spurred at the base. *Stamens* 4, didynamous, ascending; anthers with distinct parallel cells. *Ovary* ovoid or globose, many-ovuled; style filiform; stigma minute. *Fruit* an ovoid or globose 2-celled capsule, each cell or the anterior only opening by an apical pore. *Seeds* many, angled rugose and wingless or discoid and winged.

LINARIA RAMOSISSIMA, Wall. Pl. As. Rar. t. 153; F. B. I. iv. 251; Wt. Ill. t. 165.

Deccan, Bellary District; Bababudan Hills of Mysore; E. slopes of Anamalais, on walls and rocks and in stony places.

A glabrous or slightly pubescent perennial prostrate herb with very slender branches, variable but usually triangular-hastate lobed leaves and small yellow flowers.

4. *Sutera*, Roth.

Herbs or small shrubs, often viscid. *Leaves* opposite or the upper alternate, subentire pinnatifid or toothed. *Flowers* axillary or in simple terminal racemes; bracts small, leafy. *Calyx* deeply 5-lobed, lobes narrow. *Corolla* tubular; tube slender, cylindric, straight or curved; lobes 5, the two upper outside in bud and rather smaller than the 3 lower. *Stamens* 4, didynamous, included; anthers confluent, 1-celled. *Ovary* with many ovules in each cell; style filiform; stigma slightly 2-lobed. *Fruit* an ovoid-oblong septicidal capsule, the valves bifid. *Seeds* many, minute, rugose.

SUTERA GLANDULOSA, Roth; F. B. I. iv. 258; Wt. Ic. t. 856.

N. Circars, Deccan and Carnatic, west to Coimbatore, south to near Madras, not common.

An annual erect branching herb with much cut pinnatifid leaves, and very small nearly white flowers.

5. *Mimulus*, Linn.

Erect prostrate or creeping herbs. *Leaves* opposite. *Flowers* solitary, axillary. *Calyx* tubular, 5-angled, lobes 5, short. *Corolla* 2-lipped; upper lip 2-lobed, erect or reflexed; lower 3-lobed, spreading, the throat with usually a swollen 2-lobed palate. *Stamens* 4, didynamous; anther-cells divergent, subconfluent. *Ovary* ovoid; style slender; stigma 2-lamellate. *Fruit* a compressed loculicidal capsule, the valves separating from the placentiferous dissepiment. *Seeds* many, minute, oblong.

MIMULUS ORBICULARIS, Benth.; F. B. I. iv. 259.

N. Circars, Chilka Lake, Ganjam (D. Hooper).

A prostrate creeping and rooting herb with fleshy orbicular nerveless leaves about 1 in. in diam. on thick petioles, the long-pedunculate flowers with campanulate calyx and corollas about 4 in. long apparently pale blue, the seeds minutely punctulate in lines.

6. *Mazus*, Lour.

Small herbs, often with runners. *Leaves* opposite or rosulate below, above opposite or alternate. *Flowers* in terminal subsecund racemes; bracts minute, bracteoles 0. *Calyx* campanulate, 5-lobed, the lobes leafy. *Corolla* 2-lipped, the tube short; upper lip 2-lobed, erect; lower much larger, spreading, 3-lobed; throat with a two-lobed palate. *Stamens* 4, didynamous; anther-cells divaricate. *Ovary* with many ovules; style short; stigma 2-lamellate. *Fruit* a small globose or compressed loculicidal capsule, the 2 valves entire. *Seeds* many, very minute, rugose.

MAZUS RUGOSUS, Lour.; F. B. I. iv. 259.

N. Circars, in Ganjam (Barber); W. Ghâts, in Coorg (Bourne) and Nilgiris (Lawson, Fischer) up to 7,000 ft.

A small herb without runners, the radical leaves in rosette, obovate-spathulate, crenate, the scapes usually leafless, the flowers pale blue or white streaked with blue, the leafy calyx-lobes conspicuous.

7. *Lindenbergia*, Lehm.

Annual or perennial herbs; branches erect or straggling. *Leaves* opposite or the upper alternate toothed. *Flowers* usually yellow, axillary or passing into terminal spikes or racemes; bracts leafy, bracteoles 0. *Calyx* widely campanulate, 5-lobed. *Corolla* 2-lipped; tube cylindric; upper lip outermost, short, 2-lobed; lower larger, 3-lobed, the palate with 2 folds. *Stamens* 4, didynamous, included; anthers with separate stalked cells. *Ovary* with many ovules; style filiform, clavate upwards; stigma capitate. *Fruit* a loculicidal capsule, the 2 valves separating from the placentiferous dissepiment. *Seeds* very many, minute.

Perennial herb; leaves rather thick, ovate, cuneate at base, coarsely serrate except at base, up to 2.5 in. long, 1.5 in. broad, or sometimes larger; softly pubescent; flowers large, the corolla about 1 in. long; calyx campanulate, .3 in. long; capsule acute at tip and exsert.....1. *grandiflora*.
Annual slender herb; leaves thin, ovate, cuneate at base, coarsely serrate except at base, up to 1.5 in. long, .75 in. broad, sometimes more, pubescent or glabrous; flowers small, the corolla about .5 in. long; calyx campanulate, .15 in. long; capsule acute, scarcely exsert.....2. *urticaefolia*.

1. *LINDENBERGIA GRANDIFLORA*, Benth.; F. B. I. iv. 261; Bot. Mag. t. 7738.

N. Circars, Mahendragiri Hill in Ganjam, at 4,000 ft. (Gamble, Fischer), on banks in shady woods.

A slender glandular hairy fairly stout plant with bright yellow flowers.

2. *LINDENBERGIA URTICAEOFOLIA*, Link and Otto; F. B. I. iv. 262.

Shevaroy Hills of Salem (Wight), on walls and banks.

A very slender glandular rather flaccid herb with yellow flowers.

8. *Adenosma*, R. Br.

Annual, villous or glandular, aromatic herbs. *Leaves* opposite or whorled, serrate or crenate, rugose. *Flowers* axillary or in leafy spikes racemes or heads; bracteoles conspicuous or 0. *Calyx* deeply lobed, the uppermost lobe the largest, sometimes all enlarging in fruit. *Corolla* 2-lipped, the tube cylindric; upper lip erect, entire or notched, outermost in bud; lower spreading, 3-lobed. *Stamens* 4, didynamous; anther-cells separate, stipitate, one cell of each anterior stamen or of all stamens imperfect. *Ovary* with many ovules; style filiform below, dilated at the tip, winged upwards under the entire or 2-lamellate stigma. *Fruit* an ovoid ellipsoid or lanceolate capsule, both loculicidally and septicidally 4-valved. *Seeds* many, minute, scabrous-punctate, reticulate or pitted.

Flowers axillary; 3 outer sepals in fruit ovate lanceolate, reticulate, ciliate on the margins and midrib, 2 inner linear lanceolate, narrow; leaves broadly ovate, crenate, up to 1 in. long, .75 in. broad, petiole .3 in.; seeds pitted in lines

1. *subrepens*.

Flowers axillary below, uppermost in leafy heads; 3 outer sepals in fruit lanceolate, one rather larger, hirsute, 2 inner subulate-lanceolate; leaves ovate to ovate-oblong, crenulate, up to 1.25 in. long, .6 in. broad, petiole .1 in.; seeds minutely dotted in lines.....2. *malabaricum*.

Flowers in dense terminal heads at the ends of opposite or whorled peduncles; all the sepals lanceolate, one slightly larger, ciliate; leaves ovate to ovate-oblong, coarsely crenate, up to 2 in. long, 1 in. broad, petiole 0—2 in.; seeds scabrous

3. *capitatum*.

1. *ADENOSMA SUBREPENS*, Hook. f.; F. B. I. iv. 263.
Travancore, at Valur, 1,000 ft. (Meebold); Malabar (Wight).
A trailing herb, rooting at the nodes, the flowers bluish-purple.
2. *ADENOSMA MALABARICUM*, Hook. f.; F. B. I. iv. 264.
W. Coast, in Malabar (Wight).
An erect herb, up to about 1 ft. high.
3. *ADENOSMA CAPITATUM*, Hook. f.; F. B. I. iv. 264.
W. Coast and W. Gháts, S. Canara to Travancore, in rice fields.
An erect herb, up to 2 ft. high, with blue flowers.

9. *Stemodia*, Linn.

Herbs, sometimes woody below, glandular-pubescent, often aromatic. *Leaves* opposite or sometimes whorled, serrate. *Flowers* axillary, solitary, passing into terminal leafy spikes or close racemes; bracts leafy; bracteoles 1 or 2, small. *Calyx* deeply 5-lobed; lobes narrow, equal, or the upper a little larger. *Corolla* 2-lipped; tube cylindric, often villous within; upper lip 2-lobed, erect, entire or notched; lower 3-lobed, spreading. *Stamens* 4, didynamous, included; filaments filiform; anther-cells distinct, stalked, all perfect. *Ovary* with many ovules; style filiform; stigma 2-lobed. *Fruit* a globose or ovoid capsule; valves 2, septicidal, bifid, or valves 4, dehiscent both septicidally and loculicidally; placentas not winged. *Seeds* numerous, very minute, terete.

STEMODIA VISCOSA, Roxb.; F. B. I. iv. 265; Wt. Ic. t. 1408.

Most plains Districts, in wet ground and rice fields.

A many-branched aromatic viscid-pubescent herb with sessile more or less oblong usually cordate and amplexicaul leaves and violet corolla.

10. *Limnophila*, R. Br.

Marsh or water plants, glabrous or pubescent, aromatic. *Leaves* with transparent dots, opposite or whorled, toothed or incised, or, if submerged, with capillaceo-multifid lobes. *Flowers* axillary, sessile or pedicelled, solitary or passing into terminal spikes or racemes; bracts leafy, bracteoles small or 0. *Calyx* 5-partite, the lobes subequal or the posterior larger. *Corolla* 2-lipped; tube cylindric; upper lip outermost, suberect, entire or 2-lobed; lower spreading, 3-lobed. *Stamens* 4, didynamous, included; anther-cells separate, stalked. *Ovary* with many ovules; style slender, deflexed at tip; stigma 2-lamellate. *Fruit* an ovoid or globose capsule, often acute, dehiscent both loculicidally and septicidally, the placentiferous dissepiment separating with the valves and usually winged with the remains of the septa. *Seeds* many, minute, angular, truncate.

Leaves pinnately nerved, not ribbed; no whorls of pinnatifid or multifid lower leaves; calyx usually striate:—

Flowers sessile in close axillary heads; leaves opposite, elliptic or ovate, up to 3.5 in. long, petioled; calyx in fruit not striate but with a strong midrib to the acuminate lobes; capsule oblong, compressed.....1. *Roxburghii*.

Flowers axillary, solitary or in spikes or racemes:—

Leaves all opposite, subsessile, elliptic-ovate or obovate, crenate-serrate, the serratures often crustaceously thickened, punctate, up to 1 in. long, .5 in. broad; flowers axillary, solitary or in spikes or racemes; calyx lobes lanceolate, acuminate, hirsute.....2. *conferta*.

Leaves opposite or 3—4-nately whorled; flowers pedicelled; calyx-lobes lanceolate-acuminate:—

Leaves sessile, semi-amplexicaul at base, linear-oblong or lanceolate, serrulate, up to 2.5 in. long, .5 in. broad; flowers in axillary or terminal many-flowered racemes, rarely solitary; calyx-lobes glabrate.....3. *gratissima*.

Leaves sessile or very shortly petioled, elliptic-oblong or -obovate, serrulate, up to 1.5 in. long, .5 in. broad; flowers usually solitary, sometimes in short axillary racemes; calyx-lobes hirsute.....4. *hirsuta*.

Leaves 3—5-ribbed from the base; lower leaves usually pinnatifid or multifid; calyx not striate:—

Flowers sessile or nearly so:—

Flowers solitary, axillary:—

Leaves all opposite, none pinnatifid or multifid, ovate-oblong or elliptic, semi-amplexicaul, crenate-serrate, up to 1 in. or rather more in length and .5 in. broad; calyx-lobes ovate, acuminate.....5. *hypericifolia*.

Upper leaves opposite, middle ones whorled, pinnatifid, lowest capillaceo-multifid; calyx-lobes glabrous, ovate, abruptly acuminate.....6. *heterophylla*.

Flowers in terminal or axillary often divaricately branched spikes, the upper leaves opposite or whorled, linear-oblong, crenulate, up to about 1.5 in. long, the lower capillaceo-multifid; calyx-lobes ovate, acuminate.....7. *polystachya*.

Flowers pedicelled, the lowest leaves always capillaceo-multifid:—

Stem 1—2 ft. high; corolla over .5 in. long; upper leaves conspicuous, oblong-lanceolate, serrate, sessile and semi-amplexicaul, up to 2 in. long, .5 in. broad, middle ones whorled, lacinate; calyx-lobes ovate abruptly acuminate, at first glandular, in fruit glabrous.....8. *racemosa*.

Stem 3—8 in. high; corolla under .3 in. long; upper leaves frequently none, sometimes linear-oblong, up to .75 in. long, .2 in. broad, middle ones whorled, lacinate; calyx-lobes ovate, acuminate, pubescent.....9. *gratioloides*.

1. *LIMNOPHILA ROXBURGHII*, G. Don; F. B. I. iv. 265.

N. Circars, Rampa Hills of Godavari, at 3,000 ft. (V. Narayanswami), in wet places in shade.

An aromatic annual herb, creeping and rooting at the base, the flowers blue-purple with a yellow mouth.

2. *LIMNOPHILA CONFERTA*, Benth.; F. B. I. iv. 266.

W. Coast Districts, in wet places, rice fields, etc., to 2,000 ft. in the W. Gháts.

A very variable erect or prostrate or floating plant, rooting at the nodes, the flowers violet-pink.

3. *LIMNOPHILA GRATISSIMA*, Bl.; F. B. I. iv. 268.

W. Coast Districts, in wet places, margins of ponds and backwaters; W. Gháts, Anamalais at 2,000 ft. (Fischer).

A tall glabrous plant, decumbent at base and rooting at the lower nodes, then erect; flowers purple, usually in terminal panicles of racemes with small bracts.

4. *LIMNOPHILA HIRSUTA*, Benth. ; F. B. I. iv. 268.
W. Coast Districts and lower hills of W. Gháts, in wet places.
A tall hirsute plant, reaching 18 in. in height, usually very hirsute, but occasionally (var. *glabra*, C. B. Clarke MS. from the E. Gháts) nearly glabrous and with always opposite leaves.
5. *LIMNOPHILA HYPERICIFOLIA*, Benth. ; F. B. I. iv. 269 ; Wt. Ic. t. 1409.
W. Gháts, Nilgiris, Pulneys and hills of Travancore, at 3,000—7,000 ft., in bogs and other wet places.
A tall glabrous herb, reaching 2 ft. in height with rose-purple flowers.
6. *LIMNOPHILA HETEROPHYLLA*, Benth. ; F. B. I. iv. 270.
S. Canara, Mysore and Tinnevely, apparently scarce, in rice fields and wet places.
A rather tall erect herb, with leaves of all three forms, the stems often from the nodes of a long under-water horizontal stem with many capillary leaves.
7. *LIMNOPHILA POLYSTACHYA*, Benth. ; F. B. I. iv. 269 ; Wt. Ic. t. 860.
Carnatic, in Tanjore (Wight) and other places, in rice fields and wet places, but scarce.
A water plant, with the upper parts erect and recognized by the racemes of small white flowers in terminal panicles.
8. *LIMNOPHILA RACEMOSA*, Benth. ; F. B. I. iv. 271 ; Wt. Ic. t. 861.
Cyrilla aquatica, Roxb. Cor. Pl. t. 189.
N. Circars, Deccan and W. Coast, in rice fields and flooded land, common.
A water plant, often rising to 1 or 2 ft. above the surface, the flowers pale violet with reddish blotches on the lip, usually in long bracteate racemes.
9. *LIMNOPHILA GRATIOLOIDES*, R. Br. ; F. B. I. iv. 271.
All plains Districts, in pools, swamps and rice fields.
A small much branched plant, glabrous or pubescent, smelling of turpentine, very variable, chiefly according to the amount of wetness of the locality, in mud or shallow water short and leafy, in deeper water elongate and with the capillaceo-multifid leaves developed (var. *elongata*, Benth.). Flowers white with a pink ring at the mouth of the corolla.

11. *Moniera*, B. Juss.

Glabrous herbs. *Leaves* often punctate, entire or toothed or multifid when submerged. *Flowers* axillary, solitary or racemose, yellow blue or white ; bracteoles small or 0. *Calyx* 5-partite ; lobes imbricate, the upper largest, the 2 innermost often very narrow. *Corolla* 2-lipped, tube cylindric ; upper lip outside in bud, emarginate or 2-lobed, lower 3-lobed. *Stamens* didynamous, included ; anther-cells contiguous, distinct. *Ovary* with many ovules in each cell ; style dilated at top ; stigma entire or 2-lobed. *Capsule* globose or ovoid, 2-grooved, valves 2 or 4 separating from the entire placentiferous dissepiment. *Seeds* many, minute, often striate.

Creeping herb, rooting at the nodes, the numerous branches ascending; leaves obovate-oblong, about .5 in. long, obtuse; flowers solitary, pedicelled, capsule ovoid.....1. *cuneifolia*.

Erect herbs, the stems often branched; leaves linear-lanceolate, up to 1.25 in. long, acute; capsule globose:—

Flowers solitary in the leaf axils, sessile; placentas separating, winged

2. *Hamiltoniana*.

Flowers 1—3 together in the axils, pedicelled; placentas combined, not winged

3. *floribunda*.

1. MONIERA CUNEIFOLIA, Michx. *Herpestis Monniera*, H. B. & K.; F. B. I. iv. 272. *Gratiola Monniera*, Linn.; Roxb. Cor. Pl. t. 178.

All plains Districts, and in the hills to about 4,000 ft., in wet places, even in saltish water.

A somewhat succulent creeping herb with blue flowers.

2. MONIERA HAMILTONIANA, T. Cooke. *Herpestis Hamiltoniana*, Benth.; F. B. I. iv. 272.

W. Coast, S. Canara to Cochin, in wet places.

An erect rather thick herb, the stems terete, the flowers pink.

3. MONIERA FLORIBUNDA, T. Cooke. *Herpestis floribunda*, R. Br.; F. B. I. iv. 273.

Carnatic, in Nellore and Chingleput; S. Canara (Hohenacker).

An erect slender herb with subquadrangular stems and white corolla having purplish stripes on the upper lip (Fischer).

12. Dopatrium, Buch.-Ham.

Annual slender glabrous marsh herbs. *Leaves* few, opposite, the lower pairs small, the upper minute, remote. *Flowers* small, solitary, axillary, violet; bracteoles 0. *Calyx* small, 5-partite, lobes narrow, imbricate. *Corolla* 2-lipped; tube slender, dilated to a broad throat; upper lip outside in bud, 2-lipped; lower 3-lobed, spreading. *Stamens* 2 upper perfect; filaments filiform; anthers with parallel distinct equal cells; lower pair reduced to minute staminodes. *Ovary* with many ovules; style short; stigma 2-lamellate. *Fruit* a small globose or oblong capsule, opening loculicidally, the valves placentiferous. *Seeds* many, very small, reticulately pitted or tuberculate.

Capsule linear-oblong, the fruiting pedicel deflexed; stem usually branched from the base, the many slender branches erect, up to about 6 in. high, the radical leaves few, subrosulate, obovate, at most .5 in. long, the cauline minute, linear; corolla .3 in. long.....1. *nudicaule*.

Capsule globose:—

Fruiting pedicels 0 or under .5 in. and capillary, erect; stems much branched from the base with fleshy erect branches up to 12 in. high, the radical leaves elliptic-oblong or obovate, up to 1 in. long, the cauline small, larger below but gradually smaller upwards; corolla very small, .2 in. long.....2. *junceum*.

Fruiting pedicels capillary, up to 1 in. long, horizontally spreading; stems erect, usually single or at most 2—3 from the base, fleshy, up to 18 in. high, lower leaves obovate-oblong or spatulate, up to 2 in. long, .5 in. broad, cauline very small and distant; corolla .5 in. long.....3. *lobelioides*.

1. DOPATRIUM NUDICAULE, Buch.-Ham.; F. B. I. iv. 274.

Carnatic, Nellore to Tinnevely, on damp ground near the coast.

A slender erect herb.

2. *DOPATRIUM JUNCCEUM*, Buch.-Ham.; F. B. I. iv. 274.
All plains Districts and up to 4,000 ft. in the hills, in wet places,
ponds and rice fields.
An erect very slender fleshy herb with pink flowers.
3. *DOPATRIUM LOBELIOIDES*, Benth.; F. B. I. iv. 274; Wt. Ic. t. 859.
Carnatic, near Madras, in tanks and wet places.
A rather tall slender fleshy herb with comparatively large
flowers.

13. *Artanema*, D. Don.

Erect herbs, the stems tetragonal, scabrid on the angles. *Leaves* opposite, entire or serrate. *Flowers* large, blue or purple, in terminal bracteate but ebracteolate racemes, the bracts foliaceous. *Calyx* 5-partite, the lobes broad, imbricate, acuminate. *Corolla* 2-lipped; tube broad; upper lip erect, broad, emarginate, lower 3-lobed, spreading. *Stamens* 4, didynamous, perfect, the 2 upper with short filaments included in the tube, the 2 lower with long arched filaments broadly appendiculate at the base, arching to become connivent under the upper lip; anther-cells connivent at their tips. *Ovary* many-ovuled; style slender; stigma 2-lamellate. *Fruit* a globose capsule, dehiscing septically, the valves separating from the broadly-winged placentiferous axis. *Seeds* many, small, truncate, papillose.

ARTANEMA SESAMOIDES, Benth.; F. B. I. iv. 274; Wt. Ic. t. 1410.

W. Coast, in Malabar and Travancore, rising to about 3,000 ft. in the Wynaad and Coorg.

A stout erect herb or undershrub, 2—3 ft. high, with large violet-purple flowers and lanceolate-acuminate usually serrate leaves up to 4 in. long.

14. *Torenia*, Linn.

Herbs, glabrous or pubescent, usually trailing and rooting. *Leaves* opposite, entire crenate or serrate. *Flowers* axillary or in terminal or pseudo-axillary umbels or racemes; bracteoles 0. *Calyx* usually 2-lipped, oblique at the mouth, 3—5-lobed, the back of the lobes or of some of them winged or keeled. *Corolla* 2-lipped; tube cylindric, somewhat curved, dilated upwards; the upper outer lip erect, concave, notched or 2-fid, the lower larger, 3-lobed, spreading. *Stamens* 4, didynamous, the 2 upper included, the two lower arched to meet under the upper lip, often with appendages about the middle; anthers connate in pairs. *Ovary* with many ovules; style slender; stigma 2-lamellate. *Fruit* a linear or oblong septicidal capsule, the valves separating from the placentiferous dissepiment which is often winged. *Seeds* many, rugose or cancellate.

Calyx, especially in fruit, rather broadly winged:—

Calyx and *corolla* both small, together under .7 in. long:—

Calyx broadly ovoid with ciliate wings; pedicels slender, .5—1 in. long; lower filaments without appendages; leaves ovate, acute, sharply serrate, cuneate or sub-cordate at base, up to 1.25 in. long, petiole .25—5 in. long

1. *cordifolia*.

Calyx narrowly oblong with ciliate wings; pedicels slender, 1—2 in. long; lower filaments with clavate appendages; leaves triangular-ovate, acute, crenate-serrate, obtuse at base, up to 1.5 in. long, petiole 1—2 in. long

2. *courtallensis*.

Calyx and corolla both long, the calyx narrowly oblong, especially in fruit, not ciliate, .7—1 in. long, the lobes acuminate, decurrent at base; corolla up to 1.25 in. long; lower filaments with subulate appendages; pedicels up to nearly 2 in. long, thick and usually deflexed in fruit; leaves ovate-lanceolate, acuminate, obtuse at base, serrate, up to 2 in. long, petiole 1—5 in. long

3. *travancorica*.

Calyx, especially in fruit, narrowly winged, the wings often only keeled not decurrent, hirsute, ciliate; corolla small, up to .75 in. long; lower filaments with short rounded appendages; pedicels 1—1.5 in. long, thickened and deflexed in fruit; leaves ovate to ovate-oblong, sub-obtuse, truncate or subcordate at base, distantly serrate, up to 1.5 in. long, petiole 1—2 in. long.....4. *vagans*.

Calyx not winged:—

Calyx in fruit glabrous, narrowly oblong, .5—75 in. long, strongly keeled, the keels decurrent on the stout pedicel; corolla 1—1.25 in. long; appendages of lower filaments shortly subulate; leaves deltoid-ovate, crenate, subcordate, sparsely hirsute, .75 in. long, petiole up to .5 in. long.....5. *bicolor*.

Calyx in fruit not strongly keeled, hirsute:—

Calyx .75 in. long, reticulate in fruit; pedicels 1.5 in. long; corolla up to 1.5 in. long, broad at mouth; appendages subulate; leaves deltoid-ovate, acute, truncate or cordate at base, coarsely serrate, up to 2 in. long, 1 in. broad, but usually smaller, very pubescent, petiole .3—5 in. long.....6. *hirsuta*.

Calyx .4 in. long, hirsute, cleft nearly to the base, the lobes lanceolate; pedicels 2—4 at the node, spreading, .3—4 in. long; corolla short; appendages minute; leaves ovate or ovate-lanceolate, acute, serrate, up to 1 in. long, petiole under .25 in. long.....7. *parviflora*.

1. *TORENIA CORDIFOLIA*, Roxb. Cor. Pl. t. 161; F. B. I. iv. 276.

N. Circars, on Mahendragiri Hill, Ganjam (Fischer); W. Gháts, Carcoor Ghát in Malabar (Beddome).

A low erect trichotomously branching herb up to 10 in. high, the stems and branches tetragonous; corolla small, pale bluish purple.

2. *TORENIA COURTALLENSIS*, Gamble in Kew Bull. 1923, ined. *T. cordifolia*, Roxb.; F. B. I. iv. 276 in note by Sir J. D. Hooker.

W. Gháts, Anamalais and hills of Madura, Tinnevely and Travancore, at about 4,000 ft.

A trailing herb with long decumbent stems and long pedicels; flowers lilac, the lower lip mottled with purple (Blatter and Hallberg).

3. *TORENIA TRAVANCORICA*, Gamble n. comb. *T. asiatica*, Hook. f.; F. B. I. iv. 277 in part; Wt. Ic. t. 862; Bot. Mag. t. 4249.

W. Gháts, hills of Travancore and Tinnevely.

A creeping annual herb with large flowers, white with blue blotches on the lobes of the lower lip.

4. *TORENIA VAGANS*, Roxb.; F. B. I. iv. 277. *T. hirtella*, Hook. f.; F. B. I. iv. 277 in part.

W. Gháts, Nilgiris, especially on the E. side, at 5,000—6,000 ft. (Clarke, Gamble).

A diffuse trailing and rooting herb with pale blue corolla having darker blotches on the lobes of the lower lip.

5. *TORENIA BICOLOR*, Dalz.; F. B. I. iv. 278.
W. Gháts and W. Coast from S. Canara to Travancore, up to 2,000 ft.
A small trailing and rooting herb with small leaves and the corolla with dark blue or violet upper and white lower lip. It might be the "Kaka-pu" of Rheede Hort. Mal. ix. t. 53.
6. *TORENIA HIRSUTA*, Benth.; Bot. Mag. t. 5167. *T. asiatica* var. *hirsuta*, Hook. f.; F. B. I. iv. 277.
W. Gháts, in most Districts, but especially W. Nilgiris, at 3,000—6,000 ft.
A rather stout hirsute diffuse herb with handsome flowers, white on the mid-lobe of the lower lip, deep blue on the side lobes, pale blue on the upper lip.
7. *TORENIA PARVIFLORA*, Ham.; F. B. I. iv. 278.
N. Circars, Bison Hills, Godavari (Barber).
A small decumbent annual up to 8 in. in height, with blue pedicellate flowers clustered in the upper axils.

Torenia Fournieri, Linden. is an introduction from Cochin China, which is frequently grown in gardens for its showy flowers of a pale blue with bright purple blotches on the lobes of the lower lip and yellow in the throat and tube (Bot. Mag. t. 6747).

15. *Vandellia*, Linn.

Herbs, usually annual, glabrous or pubescent. *Leaves* opposite, often toothed. *Flowers* small, axillary or racemose; bracteoles 0. *Calyx* campanulate not winged, cleft in 5 lobes, sometimes to the base. *Corolla* 2-lipped; tube cylindric; upper lip outer, erect, notched or bifid, lower 3-lobed spreading. *Stamens* 4, didynamous, the 2 upper on the corolla throat, usually included, the 2 lower with arched filaments having a subulate or rounded appendage towards the base; anthers cohering in pairs, the cells divaricate. *Ovary* with many ovules; style slender; stigma 2-lamellate. *Fruit* a globose ovoid or linear septicidal capsule, the valves separating from the placentiferous septum, which is usually more or less winged. *Seeds* many, rugose.

Leaves pinnately nerved:—

Capsule about equalling the calyx; placentiferous dissepiment broadly winged:—
Calyx not divided below the middle, lobes acute, glabrous except the prominent rib; flowers pedicelled, axillary or subracemose at the ends of the branches; filaments of lower stamens with subulate appendages; leaves suborbicular ovate or lanceolate, shortly serrate, up to .75 in. long; petiole about .1—3 in. long

1. *crustacea*.

Calyx divided to the base or near it, the lobes strigosely white hispid; filaments of lower stamens with rounded appendages:—

Erect herb with the flowers in lax axillary and terminal racemes; leaves at the main nodes large, ovate or elliptic, obtuse, serrate, membranous, up to 2 in. long, 1 in. broad, petioled, those on branch nodes smaller and sometimes sessile.....2. *hirsuta*.

Diffuse herb, many-branched, with axillary flowers solitary or in pairs; leaves ovate or ovate-cordate, entire or serrate, about .5 in. long, subsessile

3. *scabra*.

Capsule longer than the calyx; placentiferous dissepiment narrowly winged:—

Calyx not divided to the base in flower, scarcely so in fruit; capsule ellipsoid:—

Erect simple or little-branched herb with suborbicular, shortly serrate leaves up to .75 in. long and broad, nearly sessile; pedicels very slender

4. *nummularifolia*.

Much branching low herb with ovate-cordate or suborbicular, crenate-serrate leaves .7—1 in. in diam. nearly sessile; pedicels none, the flowers congested in the leaf axils.....5. *sessiliflora*.

Calyx divided to the base in narrow linear-lanceolate lobes; narrowly oblong; capsule .3—5 in. long; pedicels usually axillary, deflexed in fruit; leaves ovate, obtuse or subacute, obscurely crenate-serrate, up to 1 in. long, petiole about .1 in. long.....6. *pedunculata*.

Leaves with 3—5 ribs from the base, sessile, elliptic, obtuse, up to .75 in. long; calyx divided to the base, shorter than the ovoid capsule, whose placentiferous dissepiment is tufted at top, but scarcely winged, the calyx-lobes linear, hispid at tip; pedicels solitary, axillary, filiform, longer than the leaves; staminal appendages subulate.....7. *pyxidaria*.

1. *VANDELLIA CRUSTACEA*, Benth.; F. B. I. iv. 279; Wt. Ic. t. 863.

All plains Districts, usually in wet places or rice fields, often in gardens.

A glabrous or pubescent annual herb, branching diffusely and rooting, the corolla purplish or white.

2. *VANDELLIA HIRSUTA*, Ham.; F. B. I. iv. 280.

W. Coast, S. Canara to Travancore, in fields.

A pubescent erect herb, with pale violet corolla and globose capsule.

3. *VANDELLIA SCABRA*, Benth.; F. B. I. iv. 281.

W. Deccan, W. Gháts and W. Coast, up to 4,000 ft., in rice fields, etc.

A diffuse herb with corolla having the lower lip white and the upper one brown (Lawson).

Var. *laxa* Hook. f. Much elongate and very slender, the leaves so reduced that the inflorescence becomes a raceme; lower leaves rather larger. Without locality (Wight); Guindy (Lawson).

4. *VANDELLIA NUMMULARIFOLIA*, D. Don.; F. B. I. iv. 282.

Hills of Coimbatore, at Minchiguli, 4,800 ft. (Fischer); Nilgiris, at Naduvatum, 6,000 ft. (Lawson).

A small herb with red-purple corolla.

5. *VANDELLIA SESSILIFOLIA*, Benth.; F. B. I. iv. 282.

W. Gháts, Nilgiri, Anamalai and Pulney Hills at 2,000—6,000 ft. (Lawson, Fischer).

An erect herb with close clusters of sessile flowers, often cleistogamic (Lawson).

6. *VANDELLIA PEDUNCULATA*, Benth.; F. B. I. iv. 282.

N. Circars, on the Godavari (Bourne); W. Gháts, in the Anamalai and Pulney Hills, up to 2,000 ft.; W. Coast, in Travancore, in rice fields and other wet places.

A creeping herb with long branches rooting at the lower nodes, the corolla white with a pale violet margin or pale blue with a white spot.

7. *VANDELLIA PYXIDARIA*, Maxim. *V. erecta*, Benth.; F. B. I. iv. 281.
N. Circars in the Upper Godavari (Gamble); Gazalhati Pass,
N. Coimbatore (Wight).
A slender divaricatingly branched herb with small apparently
white flowers.

16. *Ilysanthes*, Rafin. (including *Bonnaya*, Link and Otto).

Annual glabrous herbs, usually of marshes. *Leaves* opposite, entire or toothed, ribbed from the base or penninerved. *Flowers* small, axillary and solitary or in terminal racemes, bracteate, not bracteolate, peduncles often deflexed in fruit. *Calyx* 5-lobed, usually deeply, the lobes narrow. *Corolla* 2-lipped; tube cylindric, or widening above; upper lip outside, broad, usually shortly bifid, lower spreading, 3-lobed. *Stamens* 2, upper alone perfect, subincluded; lower reduced to 1—2-lobed often glandular hairy staminodes. *Ovary* with many ovules; style slender; stigma 2-lamellate. *Fruit* an ovoid oblong or linear septicidal capsule, the valves entire, separating from the placentiferous septum. *Seeds* numerous, rugose.

Leaves with 3—5 ribs from the base; staminodes usually bilobed; capsule ovate or shortly oblong:—

Erect herbs, 4—18 in. in height:—

Corolla rather large, 3—5 in. long or longer, glandular-hairy within; lower leaves oblong or oblong-lanceolate up to .75 in. long, upper linear smaller; flowers solitary, axillary, the pedicels filiform, up to 1 in. long, deflexed in fruit; capsule ovoid-oblong, up to .25 in. long.....1. *hyssopioides*.
Corolla small, about .25 in. long; lower leaves ovate lanceolate or oblong, up to 1 in. long, upper smaller; flowers solitary axillary or in slender terminal racemes, the pedicels filiform, up to .75 in. long; capsule ovoid-oblong up to .2 in. long.....2. *parviflora*.

Erect minute herbs with single stems under 3 in. high; corolla .2—3 in. long, the lobes broadly spreading; leaves ovate or elliptic-oblong, under .25 in. long, obtuse; pedicels capillary; capsule subglobose.....3. *minima*.
Creeping and rooting herbs with stems up to 10 in. long; corolla 3—4 in. long, the lips spreading; leaves ovate or orbicular, 3—5 in. in diam., obtuse, entire or slightly dentate; pedicels very short; capsule globose.....4. *rotundifolia*.

Leaves penninerved; staminodes entire; capsule narrow, linear:—

Leaves sharply deeply and closely serrate:—

Erect, diffusely branched; leaves sessile, oblong, obtuse or subacute, glabrous, spinous-serrate, up to 1 in. long, .5 in. broad; flowers in lax terminal racemes with subulate bracts, pedicelled; capsules narrowly linear-oblong, .5 in. long.....5. *serrata*.

Prostrate, creeping and rooting at the nodes; leaves petioled, elliptic-oblong, rounded at apex, finely serrate, up to 2 in. long, .75 in. broad; flowers in axillary and terminal racemes with narrow lanceolate bracts; capsules very slender, .75 in. long.....6. *reptans*.

Leaves distantly and shallowly serrate:—

Stems decumbent at base, rooting at the nodes, the branches ascending; leaves oblong obovate-lanceolate or oblanceolate, up to 1.5 in. long, .4 in. broad, broadly petioled to sessile; flowers in terminal and axillary racemes with linear-lanceolate bracts, sometimes solitary; capsules up to .5 in. long.....7. *veronicaefolia*.

Stems erect, short, much-branched; leaves linear-oblong, shortly and distantly serrate, up to 1 in. long, .15 in. broad, sessile; flowers in leafy terminal or axillary racemes, the bracts setaceous; capsules up to .4 in. long.....8. *oppositifolia*.

Leaves entire or very nearly so, linear, up to 1.5 in. long and very narrow, scarcely over .1 in. broad, sessile; flowers in slender racemes terminal or axillary, sometimes solitary, the slender pedicels deflexed, bracts subulate; capsules very slender, up to .5 in. long.....9. *tenuifolia*.

1. *ILYSANTHES HYSSOPIOIDES*, Benth.; F. B. I. iv. 283; Wt. Ic. t. 857.
Most Districts, in wet places, especially rice fields, up to 4,000 ft. in the hills.
A straggling slender herb reaching 18 in. in height, the flowers pale blue or white with darker markings, sometimes nearly 1 in. long, the staminodes large and clavate, obscurely bilobed, glandular.
2. *ILYSANTHES PARVIFLORA*, Benth.; F. B. I. iv. 283. *Gratiola parviflora*, Roxb. Cor. Pl. t. 203.
Most Districts in the plains, in wet places.
An erect branching herb, smaller than the last and with smaller blue or white flowers, the staminodes bilobed.
3. *ILYSANTHES MINIMA*, Benth.; F. B. I. iv. 284.
Vandalur in Chingleput (Bourne); Tinnevely, about Pallamcottah, in rice fields (Wight).
A minute erect herb with rather large yellow flowers.
4. *ILYSANTHES ROTUNDIFOLIA*, Benth.; F. B. I. iv. 284. *Gratiola rotundifolia*, Linn.; Roxb. Cor. Pl. t. 204.
E. Coast (*fide* Roxburgh); W. Coast, S. Canara to Travancore, in wet places, banks of ponds, etc.
A creeping herb with round leaves and white flowers, the staminodes rather large.
5. *ILYSANTHES SERRATA*, Urban. *Bonnaya brachiata*, Link and Otto; F. B. I. iv. 284.
All plains Districts and up to about 4,000 ft. in the hills, in wet places, pasture lands, on rocks, etc., common.
A stiff erect herb with pink, purple or white flowers.
6. *ILYSANTHES REPTANS*, Urban. *Bonnaya reptans*, Spr.; F. B. I. iv. 284. *B. veronicaefolia*, Wt. Ic. t. 1411 not of Spr.
Madras (Shuter); Malabar (Wight); Travancore (Bourdillon, Venkoba Row) in swampy places.
A creeping herb with light purple flowers.
7. *ILYSANTHES VERONICAEOFOLIA*, Urban. *Bonnaya veronicaefolia*, Spr.; F. B. I. iv. 285. *Gratiola veronicaefolia*, Roxb. Cor. Pl. t. 154. *G. grandiflora*, Roxb. l. c. t. 179. *Bonnaya verbenaeefolia*, Spr.; Wt. Ic. t. 1412.
All Districts in the plains and up to 5,000 ft. in the hills, in wet places, common.
A very variable species, whether in habit, in leaf or in flower, the flowers usually violet with darker lines. The varieties *grandiflora* and *verbenaeefolia* are connected by intermediates with the species.

8. *ILYSANTHES OPPOSITIFOLIA*, Urban. *Gratiola oppositifolia*, Roxb. Cor. Pl. t. 155. *Bonnaya oppositifolia*, Spr.; F. B. I. iv. 286.
Deccan and Carnatic, also W. Coast, in wet places, not common.
A small inconspicuous plant with blue flowers.
9. *ILYSANTHES TENUIFOLIA*, Urban. *Bonnaya tenuifolia*, Spr.; F. B. I. iv. 286.
W. Coast, Malabar and Travancore.
A small very slender tufted weak marsh herb with pale blue flowers.

FLORA
OF THE
PRESIDENCY OF MADRAS

BY
J. S. GAMBLE, C.I.E., M.A., F.R.S., F.L.S.
LATE OF THE INDIAN FOREST DEPARTMENT

PART VI
SCROPHULARIACEAE TO PLANTAGINACEAE

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INTRODUCTION TO PART VI.

I HAVE thought it best to add a few pages to the proper number of the Part, in order to complete the Families of the GAMOPETALÆ. Part VII will therefore be able to start at once with the MONOCHLAMYDEÆ.

Such Supplementary Notes as are necessary for Parts V and VI will soon appear in the 'Kew Bulletin,' but they are not many.

J. S. GAMBLE.

Liss: March, 1924.

17. *Microcarpaea*, R. Br.

A very small slender diffuse or creeping nearly glabrous herb. *Leaves* opposite, sessile, oblong, obtuse, entire. *Flowers* minute, axillary, solitary, sessile; bracteoles 0. *Calyx* tubular, 5-angled, 5-lobed, the ribs thick. *Corolla* very short; tube broad; lobes 5, broad, spreading, the 2 upper partially connate. *Stamens* 2 perfect; filaments filiform; anthers confluent, 1-celled; staminodes 0. *Ovary* many-ovuled; style filiform; stigma capitate recurved. *Fruit* a small ovoid loculicidal capsule, included in the calyx, valves separating from the placentiferous dissepiment. *Seeds* very small, ellipsoid.

MICROCARPAEA MUSCOSA, R. Br.; F. B. I. iv. 287.

W. Coast, S. Canara to Travancore, in marshy places.

A minute tufted slender herb, the branches interlacing, the stems rooting at the nodes, the leaves about 25 in. long.

18. *Peplidium*, Delile.

Small prostrate or creeping glabrous herbs. *Leaves* opposite, fleshy, entire, more or less obovate. *Flowers* small, axillary, sub-sessile, 1—3-nate. *Calyx* tubular, 5-ribbed, obtusely 5-lobed, enlarged and ovoid-globose in fruit. *Corolla*-tube short; lobes 5, broad, subequal or one broader. *Stamens* 2, included; filaments broad, curved; anthers 1-celled; staminodes 0. *Ovary* many-ovuled; style short; stigma large, flat, recurved over the anthers. *Fruit* a globose or ovoid capsule, the walls fragile, bursting irregularly, the placentiferous dissepiment winged. *Seeds* numerous, angular, truncate, dotted.

PEPLIDIUM MARITIMUM, Wettst. *P. humifusum*, Del.; F. B. I. iv. 287. *Microcarpaea cochlearifolia*, Sm.; Wight in Hook. Bot. Misc. iii. Suppl. t. 29.

E. Coast Districts, on the margins of tanks and in similar wet places; W. Ghâts, swamps and ponds in the Pulney Hills (Bourne).

A small prostrate herb, rooting at the nodes, the small flowers pale pink, the capsules bursting very easily, the leaves orbicular obovate or spatulate.

19. *Glossostigma*, Arn.

Minute glabrous creeping herbs. *Leaves* opposite or fascicled, linear or spatulate, entire. *Flowers* minute, axillary, solitary, bracteoles 0. *Calyx* campanulate, obtusely 3—4-lobed. *Corolla*-tube short; lobes 5, subequal, spreading. *Stamens* 2 (in the Indian species) or 4; filaments filiform; anthers with diverging cells, their tips confluent. *Ovary* many-ovuled; style short; stigma dilated, spatulate, recurved. *Fruit* a small loculicidal capsule, enclosed in the calyx; valves entire, separating from the columnar not winged placentiferous axis. *Seeds* minute, ellipsoid.

GLOSSOSTIGMA SPATHULATUM, Arn.; F. B. I. iv. 288. *Microcarpaea spathulata*, Benth.; Wight in Hook. Bot. Misc. ii. Suppl. t. 4.

Carnatic, margins of tanks and other wet places.

A minute tufted herb creeping and rooting at the nodes, the branches much interwoven. The flowers in Wight's fig. are pale pink.

20. *Scoparia*, Linn.

Herbs or undershrubs, with twiggly branches. *Leaves* opposite or whorled, entire or toothed, punctate. *Flowers* small, white or yellow, axillary, solitary or binate; bracteoles 0. *Calyx* small, 4-5-partite, the lobes imbricate. *Corolla* rotate, 4-lobed, the throat densely bearded; lobes obtuse, subequal. *Stamens* 4, subequal; filaments filiform; anther-cells distinct, parallel or diverging. *Ovary* with many ovules; style subclavate; stigma notched or truncate. *Fruit* a small globose or ovoid septicidal capsule, enclosed in the calyx, the valves membranous, separating from the placentiferous axis. *Seeds* many, angled, scrobiculate.

SCOPARIA DULCIS, Linn.; F. B. I. iv. 289.

All plains Districts and to about 3,000 ft. on dry hills, a tropical American plant now run wild and very common in India, on waste lands and fallow fields.

A glabrous undershrub sometimes up to 3 ft. in height, with small white flowers and lanceolate or elliptic-lanceolate coarsely serrate leaves.

21. *Veronica*, Linn.

Herbs or shrubs, rarely trees. *Leaves* opposite, the upper ones only or sometimes all occasionally alternate. *Flowers* solitary axillary, or in terminal or axillary racemes, bracteate but not bracteolate. *Calyx* 4-5-partite, the lower lobes connate, the upper if present smaller. *Corolla* rotate or shortly salver-shaped, blue purple or white; lobes 4 or 5, the upper and lower usually narrower. *Stamens* 2, exserted, adnate to the corolla-tube on either side of the upper lobe; anther-cells confluent at their tips. *Ovary* many- or few-ovuled; style simple; stigma subcapitate. *Fruit* a compressed or turgid 2-grooved capsule, dehiscing in various ways. *Seeds* many or few, smooth or rugose, sometimes winged.

Prostrate herbs, the leaves of flowering branches alternate; flowers solitary in the leaf-axils:—

- Pedicels about as long as the leaves; capsule-cells globose, turgid, hispid; leaves ovate-cordate or orbicular, coarsely serrate, up to .75 in. in diam.....1. *agrestis*.
 Pedicels much longer than the leaves; capsule-cells flattened, reticulate; leaves ovate, coarsely crenate-serrate, up to 1.5 in. long.....2. *persica*.

Erect herbs, capsules broadly obcordate:—

- Flowers in long terminal bracteate racemes; leaves very small, ovate-cordate, crenate, subsessile, those of the flowering raceme alternate.....3. *arvensis*.
 Flowers in axillary slender racemes; leaves rather large, ovate, crenate-serrate, truncate at base, opposite.....4. *javanica*.

1. *VERONICA AGRESTIS*, Linn.; F. B. I. iv. 294.

Nilgiri Hills, usually above 5,000 ft., a weed of cultivation, probably introduced.

A prostrate annual weed with small blue flowers.

2. *VERONICA PERSICA*, Poir.; F. B. I. iv. 294.
Nilgiri Hills, about Ootacamund, at 7,000 ft., a weed of cultivation, probably introduced but likely to spread as in other countries.
A prostrate annual weed with rather large blue flowers.
3. *VERONICA ARVENSIS*, Linn.; F. B. I. iv. 296.
Nilgiri Hills, above 6,000 ft., a weed of cultivation and waste land, probably introduced.
An erect annual weed, with very small blue or white flowers.
4. *VERONICA JAVANICA*, Bl.; F. B. I. iv. 296.
W. Ghâts, Nilgiris, Pulneys and hills of Travancore above 6,000 ft.
A pubescent annual herb with many-branched slender stems and small flowers and capsules.

22. *Buchnera*, Linn.

Annual rigid herbs, black when dry. *Leaves*: lower opposite, broad; upper alternate, narrow. *Flowers* sessile, axillary or in bracteate spikes, bracteoles 2. *Calyx* tubular, 5-lobed, 10-ribbed, the lobes short. *Corolla*-tube slender; lobes 5, flat, subequal, spreading, the upper inmost in bud. *Stamens* 4, didynamous, included; anthers 1-celled, vertical, dorsifixed, the connective sometimes mucronate. *Ovary* with many ovules; style thickened or clavate above; stigma entire or notched. *Fruit* an oblong loculicidal capsule; valves entire, coriaceous, separating from the placentas. *Seeds* very many, angled, obovoid or oblong.

BUCHNERA HISPIDA, Ham.; F. B. I. iv. 298; Wt. Ic. t. 1413.

Most Forest Districts, in grassy places.

An erect hispid herb with pale purple flowers growing to about 18–24 in. in height, the lower leaves obovate or oblong, coarsely serrate, the upper lanceolate or linear.

23. *Striga*, Lour.

Herbs, usually scabrid, discoloured or black when dry, generally parasitic. *Leaves*: the lower opposite, the upper alternate, linear, entire, rarely toothed, sometimes reduced to scales. *Flowers* axillary or the upper in bracteate spikes; bracteoles usually 2. *Calyx* tubular, the tube with 5, 10 or 15 ribs; lobes 5. *Corolla*-tube slender, abruptly incurved at or above the middle; limb spreading, the upper lip inner in bud, usually short, notched or 2-fid, the lower 3-lobed. *Stamens* 4, didynamous, included; anthers 1-celled, vertical, dorsifixed, the connective sometimes mucronate. *Ovary* many-ovuled; style slender, thickened upwards; stigma entire. *Fruit* an oblong obovoid or subglobose capsule, loculicidal, the valves entire septiferous, separating from the placentas. *Seeds* very many, ovoid or oblong, usually reticulate.

Calyx 5-ribbed, the ribs running to the apex of each lobe:—

A reddish-brown root parasite with tuberous rootstock, often many branched; leaves scale-like; corolla pink.....1. *orobanchoides*.

A green plant, not recorded as parasitic, the root not tuberous, little branched; leaves linear with crustaceous glandular scabrid margins; corolla white

2. *densiflora*.

Calyx 10-ribbed, occasionally 15-ribbed, but the secondary ribs always ending at the sinus between the lobes, the ribs with stiff hairs on bulbous bases; an erect parasitic herb, little branched; leaves linear; corolla yellow or sometimes white

3. *lutea*.

Calyx 15-ribbed, all ribs continued to the apex of the lobe:—

Corolla small, white, tube under .75 in. long, limb about .5 in. in diam.; calyx-ribs usually with crustaceous glands bearing minute spines and sometimes almost quite white; leaves linear, up to 2 in. long and sometimes with 1—2 teeth on the margins; parasitic.....4. *euphrasioides*.

Corolla large, tube over .75 in. long, limb nearly 1 in. in diam.; calyx slender, the lobes long acuminate with close glandular and pubescent ribs; leaves linear, up to 2 in. long, narrow.....5. *Masuria*.

1. *STRIGA OROBANCHOIDES*, Benth.; F. B. I. iv. 299; Wt. Ic. t. 1414.

Deccan, in most Districts; Carnatic, in Tinnevely; W. Gháts, in S. Canara and Malabar, up to 6,000 ft. in the hills, usually on red and gravelly soils.

A parasitic plant found on the roots of various plants, chiefly on *Lepidagathis* in Acanthaceae (Wight and others), also on *Euphorbia antiquorum* (Fischer), *Dysophylla* (Barber). The pink corolla has a white spot at the base of each lobe. The calyx is hispid-pubescent, the flowers in dense terminal spikes with short bracts.

2. *STRIGA DENSIFLORA*, Benth.; F. B. I. iv. 299.

N. Circars, Deccan and Carnatic.

An erect scabrid herb, the leaves up to 1.5 in. long, very narrow, the flowers in slender spikes with long bracts and linear bracteoles, the calyx with crustaceous glandular subulate lobes.

3. *STRIGA LUTEA*, Lour.; F. B. I. iv. 299.

All Districts and up to 7,000 ft. in hills, in dry grassy places and among crops.

An erect scabrous hirsute branching parasitic herb, usually pale when dry, the leaves up to 1.5 in. long, very narrow and rough, the flowers in slender spikes with long bracts and minute bracteoles. Watt in Comm. Prod. Ind. records it as parasitic and harmful on sugarcane and Sorghum. I have found it myself on the latter.

4. *STRIGA EUPHRASIOIDES*, Benth.; F. B. I. iv. 299; Wt. Ic. t. 855.

Most Districts, both in the plains and up to about 4,000 ft. in the hills.

A very variable erect herb either slender and rather short, turning black when dry, or stout and branching and greenish-grey when dry. Duthie (Fl. Gang. Pl. ii. 157) says that it is parasitic and destructive in crops of sugarcane and Sorghum, but this is not recorded from Madras. The leaves reach 2 in. in length and are scabrous.

5. *STRIGA MASURIA*, Benth.; F. B. I. iv. 300.

Carnatic, at Guindy near Madras (Shuter).

A slender erect scabrid herb.

24. *Alectra*, Thunb.

Erect rigid usually scabrid herbs, black when dry. Leaves opposite or alternate, sometimes reduced to scales. Flowers in terminal spikes

or racemes, bracteate and bracteolate. *Calyx* campanulate, 5-lobed, the lobes valvate or open in bud. *Corolla* tube broad, the limb oblique; lobes 5, spreading, the lower outer in bud. *Stamens* 4, didynamous, the anthers touching in pairs; cells parallel, their bases mucronate. *Ovary* 2-celled; ovules very many; style simple; stigma elongate, oblong-clavate. *Fruit* a subglobose or ovoid loculicidal capsule, the valves entire, bearing the placentas. *Seeds* very many, minute, linear-cuneate, the testa lax, reticulate longitudinally.

ALECTRA THOMSONI, Hook. f.; F. B. I. iv. 297.

N. Circars, Ethakonda in Godavari, 1,700 ft. (V. Narayanswami).
An erect stiff herb with stems having the leaves reduced to green brown or purple scales, and corolla yellow with red nerves. It is apparently parasitic and usually on Acanthaceae like *Strobilanthes auriculatus*.

25. *Rhamphicarpa*, Benth.

Erect glabrous herbs, drying black. *Leaves*: lower opposite, upper alternate, narrow, entire or pinnatisect. *Flowers* axillary and pedicelled or in bracteate racemes; bracteoles 1—2 or 0. *Calyx* campanulate with 5 acuminate lobes. *Corolla*-tube slender, elongate, straight or incurved; lobes 5, broad, spreading, subequal or the upper connate. *Stamens* 4, didynamous, included; anthers 1-celled, vertical, dorsifixed. *Ovary* many-ovuled; style slender, thickened above; stigma simple. *Fruit* a capsule compressed at right angles to the septum, usually beaked, loculicidal; valves septiferous, placentas large. *Seeds* small, obovoid or oblong; testa reticulate.

RHAMPHICARPA LONGIFLORA, Benth.; F. B. I. iv. 300; Wt. Ic. t. 1415.

W. Coast, in S. Canara, in marshy pastures.

An erect herb reaching 2—12 in. in height with white corolla and beaked capsule, the leaves pinnatisect with filiform segments.

26. *Sopubia*, Ham.

Erect perennial herbs. *Leaves* opposite, or the upper alternate, narrow, linear trifid or pinnatisect. *Flowers* in spikes or racemes with leafy bracts; bracteoles 2. *Calyx* campanulate, 5-lobed. *Corolla*-tube funnel-shaped, dilated at the throat; lobes 5, spreading, the 2 upper inmost in bud. *Stamens* 4, didynamous, the anthers meeting in pairs; one anther-cell fertile, longitudinally dehiscent, the other small and imperfect. *Ovary* many-ovuled; style slender; stigma thickened and tongue-shaped, obtuse or capitate at apex. *Fruit* an ovoid or oblong loculicidal capsule, the valves entire or bifid, separating from the dissepiment which bears large placentas. *Seeds* numerous, oblong or cuneate, often truncate; testa lax, striate or reticulate.

Calyx-teeth subulate, very slender, glabrous within, longer than the ribbed tube; corolla purple, 1—1.5 in. long, the lobes broad, spreading; sterile anther-cells acuminate; lower leaves pinnatisect 1—1.5 in. long, the lobes filiform, these passing gradually into trifid and then to simple floral bracts; capsule oblong, seeds truncate, striate. 1. *delphinifolia*.
Calyx-teeth deltoid-ovate, acute, woolly within, equalling the tube; corolla yellow with a purplish eye, under .5 in. long, the limb rotate; sterile anther-cells obtuse;

lower leaves trifid, .5—1.5 in. long, the lobes linear or filiform, passing into linear floral bracts; capsule emarginate, seeds oblong, spirally reticulate.....2. *trifida*.

1. *SOPUBIA DELPHINIFOLIA*, G. Don; F. B. I. iv. 302. *Gerardia delphinifolia*, Roxb. Cor. Pl. t. 90.

Deccan, Carnatic and E. side of W. Gháts, up to 7,000 ft., less common on W. Coast, in rocky places in the forests, fields and grassy slopes.

A pretty erect herb, reaching 1—3 ft. in height. Fyson says it is a root parasite.

2. *SOPUBIA TRIFIDA*, Ham.; F. B. I. iv. 302.

N. Circars, Mahendragiri in Ganjam at 4,500 ft. (Gamble); Deccan, on Ramandrug in Bellary (Beddome); W. Gháts, Bababudan Hills of Mysore, Nilgiris, Anamalais, Pulneys and Travancore Hills at 3,000—7,000 ft. in grassy pasture land.

A pretty herb, 1—2 ft. high.

27. *Micrargeria*, Benth.

Rigid scabrid erect herbs, black when dry. *Leaves* alternate or the lower opposite, entire or pinnatifid. *Flowers* small, in the upper axils or in long terminal bracteate spikes or racemes; bracteoles 2. *Calyx* campanulate or hemispheric; lobes 5, broad. *Corolla*-tube dilated above, incurved; lobes 5, broad, spreading, entire, subequal, the 2 upper inner in bud. *Stamens* 4, didynamous, included; anthers free, meeting in pairs, cells distinct, subequal, attached by their tips. *Ovary* many-ovuled; style slender; stigma, tongue-shaped. *Fruit* a small globose loculicidal capsule; the valves separating from 2 small globose placentas. *Seeds* numerous, oblong-cuneate; testa lax.

MICRARGERIA WIGHTII, Benth; F. B. I. iv. 303; Wt. Ic. t. 1417.

Deccan, in Mysore and Coimbatore; Carnatic in Tinnevely.

An erect herb reaching 18 in. high, with small corolla and pubescent much ~~curved~~ leaves, the lobes filiform in upper ones, spatulate in lower.

28. *Centranthera*, R. Br.

Scabrid herbs, probably more or less parasitic. *Leaves* opposite or the upper alternate, entire or toothed. *Flowers* axillary or in bracteate spikes or racemes; bracteoles 2. *Calyx* spathaceous, split on one side, compressed, entire or shortly 3—5-lobed. *Corolla*-tube long, tubular or funnel-shaped, incurved and dilated above; limb oblique; lobes subequal, spreading, the 2 upper inside in bud. *Stamens* 4, didynamous, included; anthers meeting in pairs, cells transverse, spurred or mucronate at base; one cell often imperfect. *Ovary* with many ovules; style simple, dilated above; stigma tongue-shaped, acute. *Fruit* an ovoid or subglobose loculicidal capsule; valves entire, the placentas in the middle. *Seeds* very many, conical or cuneate; testa lax, reticulate.

Leaves oblong; corolla funnel-shaped; leaves hispid, the hairs on tubercular bases; seeds conical, the testa spirally reticulate:—

Calyx .25 in. long, ovate, acute; corolla rose-coloured or white, up to .75 in. long; leaves elliptic- or linear-oblong, up to 1.5 in. long; lower filaments pilose

1. *hispida*.

Calyx .5 in. long or longer, oblong, acute; corolla white with a brownish-red blotch in the tube, .75—1 in. long; leaves oblong, the tubercles conspicuous, .5—1 in. long; all filaments pilose.....2. *indica*.
Leaves linear, up to 1 in. long, sparsely tubercular-hispid; corolla tubular, short, yellow; calyx ovoid, .2 in. long, obtuse or subacute; filaments glabrous; seeds cuneate, truncate, the testa reticulate with shining areoles.....3. *humifusa*.

1. CENTRANTHERA HISPIDA, R. Br.; F. B. I. iv. 301; Wall. Pl. As. Rar. t. 45.
Deccan, in Mysore, up to 3,000 ft.; W. Coast, S. Canara to Travancore in wet places and rice-fields.
An erect herb reaching 2 ft. in height.
2. CENTRANTHERA INDICA, Gamble n. comb. *C. procumbens*, Benth.; F. B. I. iv. 301; Trimen Fl. Ceyl. t. 68.
W. Coast in Malabar and Travancore (Wight, Fischer); S. E. Wynaad (Beddome), in wet places.
An erect diffuse herb with bright orange-coloured roots (Trimen).
3. CENTRANTHERA HUMIFUSA, Wall.; F. B. I. iv. 301.
E. Coast, Tada in Nellore (Bourne); W. Coast, S. Canara to Travancore, in wet places.
A diffuse small, erect or prostrate, herb.

29. Pedicularis, Linn.

Perennial or rarely annual semiparasitic herbs. *Leaves* alternate opposite or whorled, pinnatifid or pinnatisect. *Flowers* in bracteate terminal spikes or racemes; bracteoles 0. *Calyx* tubular or campanulate, entire or split down one side, 2—5-toothed, lateral teeth free or connate, entire or crested, lower small or 0. *Corolla* 2-lipped; tube cylindric; upper lip erect, hooded compressed obtuse acute or beaked; lower with 3 spreading or deflexed lobes. *Stamens* 4, didynamous; anthers under the upper lip meeting in pairs; cells distinct, equal, parallel, both perfect. *Ovary* many-ovuled; style slender; stigma subcapitate. *Fruit* a compressed capsule, usually more or less oblique and often beaked, loculicidal; valves often joined to the middle. *Seeds* numerous, various in shape and markings of the testa, usually reticulate.

Calyx .25—5 in. long, cleft to near the base, the teeth crested; corolla rose-pink, .75—1 in. long, the upper lip very slightly beaked; capsule obliquely ovate-falcate, .6 in. long; leaves oblong, prominently crenate, up to 2.5 in. long, .6 in. broad, pubescent.....1. *zeylanica*.
Calyx 1 in. long, tubular, the teeth crested; corolla white, 3—6 in. long with slender tube, the upper lip rounded; capsule falcate, 1 in. long; leaves pinnatifid, cut more than half way to the midrib with crenate lobes, 1.5—2.5 in. long, glandular-hairy.....2. *Perrottetii*.

1. PEDICULARIS ZEYLANICA, Benth.; F. B. I. iv. 317; Wt. Ic. t. 1419; Prain Ann. Calc. iii. 153; t. 14.
W. Ghâts, in all Districts at about 5,000—7,000 ft. in open grass lands in dampish localities; Shevaroy Hills of Salem.
A handsome species of which there are two forms, one erect up to about 2 ft. high, the other branching near the ground and diffuse, but they have no varietal differences.
2. PEDICULARIS PERROTTETII, Benth.; F. B. I. iv. 317; Wt. Ic. t. 1418; Prain Ann. Calc. iii. 119. t. 8.

W. Gháts, Nilgiris above 7,000 ft., not rare near Avalanché and Nilgiri and Mukurti Peaks in the Kundahs; Anamalais above Iyearpadi, 7,000 ft. (Barber), on grass lands.

A striking species with very long corolla-tube. The host plant, if any, has not been recorded.

Calceolaria mexicana, Benth., is a pretty yellow-flowered weed from Mexico now naturalised on the higher parts of the Nilgiris and Pulneys, also on the hills of N. Coimbatore and the Bababudan Hills of Mysore. *Antirrhinum Orontium*, Linn., has been found as an escape in the Nilgiris, and *A. majus*, Linn., the Snapdragon, in both the Nilgiri and Pulney Hills. *Scrophularia peregrina*, Linn., a herb of Asia Minor, is found as a roadside weed in the Nilgiris (Bourne). *Digitalis purpurea*, Linn., the Foxglove, is said to have lately run wild in the Nilgiris. Many handsome-flowered species may be found in gardens, such as those of *Alonsoa*, *Angelonia*, *Maurandia*, *Pentstemon*, *Russelia*.

Family CVIII. OROBANCHACEAE.

Leafless root-parasites; stem usually simple, sometimes branched, the stem or branches with scales. *Flowers* hermaphrodite, irregular, solitary or in spikes or racemes; bracts large, scale-like; bracteoles 1—2 scale-like, or 0. *Calyx* spathaceous or 2-lipped or with 4 or 5 free or connate lobes. *Corolla* hypogynous, curved, usually 2-lipped, sometimes subequally 5-lobed; upper lip often arched, lower 3-lobed, throat often with 2 villous folds. *Stamens* 4, didynamous, adnate to the corolla-tube; anthers 1—2-celled, one cell often imperfect, cells frequently spurred at the base, dehiscence by slits or apical pores. *Disk* usually obscure. *Ovary* of 2 rarely 3 connate carpels, 1-rarely 2-celled; ovules many, on free or confluent parietal placentas. *Fruit* a capsule, usually 1-celled; valves 2 rarely 3. *Seeds* many, minute; testa pitted or reticulate; albumen fleshy; embryo ovoid, often undivided.

Corolla-lobes broad, subequal, spreading:—

Calyx spathaceous, split in front nearly to the base; anther-cells unequal

1. *Aeginetia*.

Calyx tubular-campanulate, 5-lobed:—

Anthers 2-celled, 1 cell often imperfect, spurred at base; stigma peltate

2. *Christisonia*.

Anthers 1-celled, not spurred; stigma clavate.....3. *Campbellia*.

Corolla 2-lipped, upper lip 2-lobed, lower 3-lobed; anther-cells equal...4. *Orobanche*.

1. *Aeginetia*, Linn.

Leafless herbs with simple or branched, naked or scaly scapes or stems. *Flowers* few, large, solitary or corymbose; bracteoles 0. *Calyx* spathaceous, split in front nearly to the base. *Corolla*-tube broad, incurved, obscurely 2-lipped; lobes 5, broad, spreading, the two upper connate, outer in bud. *Stamens* 4, didynamous, included; anthers meeting in pairs with 1 perfect cell adnate to the filament not spurred below, the other absent from the upper pair, empty clavate and deflexed in the lower. *Ovary* 1-celled; placentas 2- or more-lobed, filling the cavity, bearing ovules all over; style slender; stigma large, peltate. *Fruit* a partially 2-valved capsule. *Seeds* crowded, minute, reticulate.

Scape slender, naked; corolla deep purple-red; placentas multiseptate.....1. *indica*.
 Scape short, stout, bracteate; corolla-tube yellow, mouth blue; placentas 2-lamellate
 2. *pedunculata*.

1. *AEGINETIA INDICA*, Linn. ; F. B. I. iv. 320; Roxb. Cor. Pl. t. 91; Wt. Ic. t. 895.

Hills of the N. Circars; W. Gháts, in almost all Districts up to about 3,000 ft.

Parasitic herb of a purplish red colour, the root of interlaced fleshy fibres. It grows apparently on the roots of many different plants.

2. *AEGINETIA PEDUNCULATA*, Wall. Pl. As. Rar. t. 219; F. B. I. iv. 320; Wt. Ic. t. 1421.

W. Ghats, S. Canara to Travancore, up to 4,000 ft.

Parasitic on the roots of grasses. A reddish or yellowish herb with short stem underground and many often long branches with sheathing bracts, the calyx orange colour.

2. *Christisonia*, Gardn.

Fleshy parasitic herbs, the stems simple or tufted on the root-stock and bearing alternate obtuse or acute scales instead of leaves. Flowers usually peduncled, with or without bracteoles. Calyx tubular, 2-lipped or with 5 lobes. Corolla-tube tubular or funnel-shaped, straight or slightly curved, the mouth with 5 nearly equal lobes or obscurely 2-lipped. Stamens 4, usually included; filaments stout, anthers 2-celled, one cell perfect the other imperfect and spurred, the upper pair sometimes with both cells perfect. Ovary 1-celled, placentas large, 2- or more-lobed, bearing all over very numerous ovules; style long; stigma large, peltate. Fruit a partially 2-valved capsule. Seeds very many, minute, testa reticulate.

Stems elongate, up to 12 in. long or longer, with few distant peduncled flowers with one bract, no bracteoles, glabrous except the corolla; anthers 2-celled, one fertile, the other sterile sharply spurred; calyx subbilabiate:—

Stem scales very small, under .25 in. long, obtuse, bracts rather longer; calyx-tube .5 to 1 in. long with triangular lobes; corolla large, up to 2.5 in. long, the lobes broad, rounded, spreading, 1.5 in. in diam. at the mouth.....1. *tubulosa*.

Stem scales oblong, up to .5 in. long, obtuse, bracts longer; calyx-tube .5—.75 in. long, the lobes triangular; corolla rather small, up to 1.5 in. long, the lobes short, obtuse, suberect, .75 in. in diam. at the mouth.....2. *Saulièrei*.

Stems short, up to about 8 in. long, glandular-hairy, with many ovate obtuse pubescent scales, flowers up to about 10, corymbosely arranged on stout peduncles or nearly sessile, bracteoles 2, large; anthers 2-celled, one perfect, the other imperfect long and sharply spurred; calyx and corolla each tubular, glandular-hairy with equal lobes.....3. *bicolor*.

Stems very short, scarcely 1 in. long or none, glabrous, with large scales; flowers crowded on stout short peduncles without bracteoles; anthers: those of longer stamens, with 1 perfect cell, the other a fleshy spur; those of shorter stamens both perfect; calyx large, 2-lipped, with long acute lobes; corolla longer with equal lobes.....4. *subacaulis*.

1. *CHRISTISONIA TUBULOSA*, Hook. f.; F. B. I. iv. 321. *Oligopholis tubulosa*, Wt. Ic. t. 1422.

W. Gháts, Mysore, Nilgiris, Anamalais, Pulneys and hills of Tinnevely and Travancore, usually at about 3,000—4,000 ft.,

about Courtallum on roots of bamboo (Wight), in S. E. Wynaad on rice (Gamble).

A tall parasitic herb, with large sparse flowers, the stems and calyx light brown, the flowers pink, yellowish on the lower lip.

2. *CHRISTISONIA SAULIÈREI*, Dunn in Kew Bull. 1914, 30.

W. Ghâts, Pulney Hills, at Kodaikanal, 7,000 ft. (Saulière).

A slender erect herb, like the former, but with smaller flowers and shorter peduncles.

3. *CHRISTISONIA BICOLOR*, Gardn.; F. B. I. iv. 322. *C. aurantiaca*, Wt. Ic. t. 1486; Spic. Neilgh. t. 167.

Nilgiri Hills, sholas at the head of the Ochterlony Valley at 6,000 ft., probably chiefly parasitic on Acanthaceae like *Strobilanthes*; Pulney Hills at Periyar Shola (Bourne); Bolampatti Hills of Coimbatore (Wight).

A fleshy plant with thick brownish yellow scaly stem, orange-coloured calyx and yellow corolla. The Pulney specimens are very small and differ slightly; they are said to have corolla and calyx rose-coloured.

4. *CHRISTISONIA SUBCAULIS*, Gardn.; F. B. I. iv. 321; Wt. Ic. t. 1423 (corrected in text).

Tinnevely Hills, about Courtallum, probably parasitic on the roots of bamboos (Trimen in Fl. Ceyl.).

A fleshy plant, scarcely showing above ground and covered with a viscid mucilage. The flowers are white, the margins of the corolla-lobes pale blue (Wt. in MS.).

3. *Campbellia*, Wt.

Fleshy parasitic herbs with thick rootstock, the stems with many obtuse scales, usually much imbricate, at any rate at first. *Flowers* peduncled, in crowded heads; bracteoles 2. *Calyx* tubular-campanulate with 5 equal lobes. *Corolla* funnel-shaped, more or less bilabiate; lobes 5, the upper lip 2- the lower 3-lobed, the lobes spreading. *Stamens* 4, exserted; filaments stout; anthers 1-celled opening by a pore at the apex, the opening then extending upwards. *Ovary* 1-celled; placentas 2, meeting in the centre, bearing very numerous ovules; style simple; stigma ovoid or clavate. *Fruit* an imperfectly 2-celled capsule. *Seeds* very many, minute, oblong; testa loose, reticulate.

CAMPBELLIA CYTINOIDES, Wt. Ic. t. 1425. *Christisonia neilgherrica*, Gardn.; F. B. I. iv. 322.

W. Ghâts, Nilgiri and Pulney Hills, in sholas at about 5,000—7,000 ft., parasitic on roots of *Strobilanthes*.

A thick plant of a yellow colour, at first with the scales much imbricate, but they become more distant as the stem elongates with age. The capsules are open quite globose.

4. *Orobanche*, Linn.

Scapigerous herbs; scapes simple or branched; scales acute. *Flowers* in spikes or racemes, each with a scale-like bract; bracteoles 2 or 0. *Calyx* unequally 4-fid or bipartite from back to front, the

lobes entire or bifid with rarely a fifth lobe. *Corolla* 2-lipped; tube curved, dilated above, circumscissile at the base; upper lip erect, crenulate notched or bifid, lower somewhat spreading, 3-lobed. *Stamens* 4, didynamous, included; anther-cells equal, parallel, the bases usually mucronate. *Disk* 0 or glandular. *Ovary* 1-celled, placentas 4, equidistant or in pairs; ovules very many; style simple; stigma funnel-shaped peltate or somewhat laterally bilobed. *Fruit* a 2-valved capsule, the valves often cohering with the style. *Seeds* very many, small, globose or ovoid.

OROBANCHE CERNUA, Loeffl.; F. B. I. iv. 325.

Var. *desertorum*, Beck. *O. nicotianae*, Wt. Ill. t. 158; F. B. I. iv. 326.

N. Circars and Deccan, parasitic on tobacco (see Wight's remarks in Spic. Neilg.) and perhaps other plants.

An erect herb with pale brown stems, the corolla with a white tube and pale blue or violet lobes.

Family CIX. LENTIBULARIACEAE.

Herbs, aquatic or in wet places, often insectivorous. *Leaves* rosulate or, when submerged, capillaceo-multifid, sometimes obsolete. *Flowers* irregular, hermaphrodite, in 1-many-flowered simple or branched scapes; bracts small or 0; bracteoles 2 or 0. *Calyx* inferior, 2—5-lobed or -partite. *Corolla* 2-lipped, spurred; the upper lip usually the smaller, entire or emarginate, the lower usually much larger, 3—5-lobed. *Stamens* 2, attached to the base of the corolla; filaments curved; anthers 2-celled, dorsifixed, the cells transversely confluent, longitudinally dehiscent. *Ovary* 1-celled, globose; ovules very many, on a free basal placenta; style short; stigma unequally 2-lobed. *Seeds* very many, minute, exalbuminous.

Utricularia, Linn.

Herbs, floating and rootless, or, on wet ground and rocks, rooting among other plants, sometimes twining, often furnished with minute bladder-like insect traps, sometimes also in floating species with floating supports to the scape. *Leaves* in floating species multifid with capillary segments, in erect or twining species entire. *Flowers* on simple or branched scapes, racemose; pedicels bracteate and often bibracteolate. *Calyx* 2-partite; lobes entire or nearly so, often accrescent. *Corolla* 2-lipped, the upper lip entire or emarginate, the lower larger and lobed, the spur straight or curved. *Stamens* 2; filaments broad. *Ovary* 1-celled, many-ovuled. *Seeds* of various shapes, minute, the testa often lax and reticulate.

Water plants, the stolons submerged; leaves whorled, with capillary segments mostly interspersed with minute bladders:—

Peduncles with a whorl of spongy floats below the inflorescence; pedicels short; seeds tabular prismatic, with 4—6 usually sharp angles and slightly winged margins.....1. *stellaris*.

Peduncles without a whorl of spongy floats; pedicels long:—

Peduncles and pedicels stout; submerged leaves very many, long, sometimes the uppermost with the rhachis inflated; seeds prismatic with sharp angles

and slightly winged margins; flowers rather large, usually 3—8....2. *flexuosa*.
 Peduncles and pedicels slender; submerged leaves very short, lobes capillary;
 seeds lenticular, with a broad dentate corky wing; flowers small, 1—3

3. *exoleta*.

Terrestrial plants, the stems rooted in mud or moss or among the roots of other plants; leaves often disappearing before flowering and sometimes capillary and furnished with minute bladders:—

Leaves more or less linear or linear-spathulate:—

Scales and bracts of the scape attached by their base:—

Flowers chiefly blue or purple:—

Scapes erect:—

Pedicels recurved in fruit; seed testa reticulate longitudinally:—

Scapes 3—8 in. high, 3—8-flowered, very slender, sometimes bifid;
 sepals ovate, acute, subequal; lower lip of corolla large, 5 in. in
 diam.; spur long, slender, conspicuously curved under the lower lip
 of the corolla, seeds ellipsoid.....4. *arcuata*.

Scapes 3—6 in. high, 3—10-flowered, rather stout, sometimes bifid;
 sepals ovate, acute, subequal, decurrent; lower lip of corolla .25 in.
 in diam.; spur straight, conical, deflexed; seeds obovoid

5. *stricticaulis*.

Pedicels not recurved in fruit:—

Scapes slender, simple, 2—6 in. high, 3—6-flowered; sepals ovate,
 acute; corolla small with obovate upper and orbicular entire lower
 lip, the latter 2—3 in. broad with straight conical spur slightly
 curved forwards; seeds subglobose, the testa with subhexagonal
 scrobiculate areoles.....6. *uliginosa*.

Scapes slender, sometimes slightly twining; spur narrowly-conic,
 curved; seeds reticulate with elongate areoles:—

Scapes short, 4—6 in. long rarely longer, the scales few distant
 lanceolate; calyx-lobes ovate, acuminate; corolla with obovate upper
 and broadly ovate reticulate lower lip; seeds reticulate with elongate
 areoles.....7. *graminifolia*.

Scapes long, 6—18 in. long, very slender, with numerous ovate acute
 small scales; calyx-lobes lanceolate, acuminate; corolla with obovate
 upper and suborbicular lower lip, the spur often much incurved;
 seeds globose, scrobiculate (Wight).....8. *squamosa*.

Scapes twining:—

Flowers large, on scapes up to 10 in. long, erect or twining, scales few
 minute; calyx-lobes ovate, one obtuse, the other acute; corolla with
 obovate upper and broadly suborbicular lower lip .5 in. broad, the spur
 conical and curved, nearly as long; seeds globose, scrobiculate (Wight)

9. *Smithiana*.

Flowers large, on twining often interlacing flexuose scapes up to 2 ft.
 long, the scales few, ovate, very small; calyx-lobes ovate acuminate,
 much enlarged and decurrent in fruit; corolla with broadly obovate
 upper and large sub-orbicular lower lip, .5—1 in. broad, the spur shorter
 slightly curved; seeds rhomboid, reticulate.....10. *reticulata*.

Flowers very small, on exceedingly slender twining scapes at most 6 in.
 long, the scales minute, ovate; calyx-lobes ovate, acute in flower, obtuse
 in fruit; corolla with ovate obtuse upper and ovate lower lip the spur
 conical pendent; seeds minute, reticulate, scrobiculate.....11. *scandens*.

Flowers yellow:—

Scapes erect, glabrous; pedicels recurved in fruit; corolla with rounded
 upper and emarginate lower lip, the palate swollen, the spur as long
 (.25 in.) slightly curved; seeds obovoid, the testa reticulate.....12. *bifida*.

Scapes filiform, twining; pedicels suberect in fruit; corolla with obovate
 slightly emarginate upper and similar but larger lower lip, the spur nearly
 as long and curved outwards; seeds ellipsoid, reticulate...13. *Wallichiana*.

Scales and bracts of the scape attached by their middle; flowers subsessile;
 capsule globose, the seed-testa reticulate:—

Spur longer than the lower lip of the corolla, acute and curved upwards;
 the upper lip oblong-obovate, obtuse, the lower 2 in. long, the margins
 somewhat crenulate.....14. *caerulea*.

Spur shorter than the lower lip of the corolla, obtuse and straight; the upper lip obovate, the lower 3 in. long, slightly more broad, the sides reflexed.....15. *roseo-purpurea*.
 Leaves orbicular or reniform, persistent; calyx-lobes very unequal; seeds glochidiate; corolla with the upper lip small suborbicular emarginate, the lower spreading, 5-lobed.....16. *striatula*.

1. *UTRICULARIA STELLARIS*, Linn. f.; F. B. I. iv. 328; Roxb. Cor. Pl. t. 180; Wt. Ic. t. 1567.
 N. Circars, in standing fresh water; Carnatic, Madras, Tanjore (*vide* Wight).
 A water plant with yellow flowers, only the inflorescence showing above the surface, held up by the floats, which have filiform external pinnules at their apices.
2. *UTRICULARIA FLEXUOSA*, Vahl.; F. B. I. iv. 329. *U. fasciculata*, Roxb.; Wt. Ic. t. 1568.
 N. Circars and Carnatic, chiefly near the coast; W. Coast, in all Districts, in rice-fields, tanks and other fresh-water wet places.
 A water plant with yellow flowers, similar to the former but with longer peduncles, larger flowers and pedicels deflexed after flowering; no floats but occasional inflated upper leaf rhachises; capsules rather large.
3. *UTRICULARIA EXOLETA*, R. Br.; F. B. I. iv. 329. *U. diantha*, Roem. & Sch.; Wt. Ic. t. 1569.
 W. Coast, S. Canara to Malabar, Travancore and Tinnevely, in wet places.
 A small water plant floating in water or sometimes rooting in wet mud, the leaves very small and sparingly lobed, occasionally the whole leaf inflated and linear, especially on mud. Flowers yellow with orange streaks, the spur rather long, the capsules small and globose.
4. *UTRICULARIA ARCUATA*, Wt. Ic. t. 1571, fig. 1; F. B. I. iv. 330.
 Bababudan Hills of Mysore (Law); S. Travancore (Wight).
 A pretty delicate species with bluish-purple flowers and prominently curved slender spur. The roots have small round bladders as have the linear-spathulate leaves.
5. *UTRICULARIA STRICTICAULIS*, Stapf in Herb. Kew. *U. caerulea* var. *stricticaulis*, Koenig. *U. reticulata* var. *uliginosa*, C. B. Clarke; F. B. I. iv. 331. *U. humilis*, Wt. Ic. t. 1572, 2. *not of* Vahl.
 N. Circars, frequent in Ganjam (Gamble); Deccan and Carnatic, Mysore, Madras and Nellore.
 A rather thick-stemmed plant with blue flowers and prominent fruiting calyx, the leaves linear, very narrow, the root bladders very small.
6. *UTRICULARIA ULIGINOSA*, Vahl. *U. affinis*, Wt. Ic. t. 1580, fig. 1; F. B. I. iv. 330. *U. brachypoda*, Wt. Ic. t. 1578, fig. 1.
 W. Ghâts, S. Canara and Mysore to Nilgiris and Travancore, up to 7,000 ft. in the hills in swampy land, more common northwards.
 A small rather obscure species with bluish-purple flowers and conical spur. The linear-oblong obtuse leaves and small bladders are very evanescent.

7. *UTRICULARIA GRAMINIFOLIA*, Vahl. *U. caerulea*, C. B. Clarke; F. B. I. iv. 331, *not* of Linn. *U. pedicellata*, Wt. Ic. t. 1578, fig. 2. *U. uliginoides*, Wt. Ic. t. 1573. *U. conferta*, Wt. Ic. t. 1575.
W. Gháts, in all Districts, especially Nilgiris and Pulneys, in bogs and other wet places at high levels, common.
A slender species with bluish-purple flowers and linear leaves on filiform stolons rooting among grass- and other plant-roots, and provided with small bladders.
 8. *UTRICULARIA SQUAMOSA*, Wt. Ic. t. 1579. *U. caerulea* var. *squamosa*, C. B. Clarke; F. B. I. iv. 331.
Nilgiri Hills, about Sispara at 5,000 ft.; Attapadi Hills of Malabar at 5,300 ft. (Fischer).
A very slender erect plant with blue flowers and linear-spathulate leaves, very evanescent.
 9. *UTRICULARIA SMITHIANA*, Wt. Ic. t. 1577. *U. caerulea* var. *Smithiana*, C. B. Clarke; F. B. I. iv. 331.
W. Gháts, Malabar or Coorg (Wight); Pulneys, at high levels (Bourne).
A slender plant resembling *U. graminifolia* but much larger, also *U. reticulata* but less twining. Flowers blue shaded mauve and lilac, leaves linear-spathulate on filiform rhizomes bearing bladders.
 10. *UTRICULARIA RETICULATA*, Smith Exot. Bot. t. 119; F. B. I. iv. 331; Wt. Ill. t. 143. *U. uliginosa*, Wt. Ic. t. 1574 (*right-hand fig. only*).
W. Coast, in all Districts, in rice-fields, climbing up the stems of the rice.
A striking and interesting species with blue-violet corolla, the palate reticulated with pale blue and white.
 11. *UTRICULARIA SCANDENS*, Oliver; F. B. I. iv. 332.
Carnatic, Madras, Arcot (Shuter); Madura, near the bills (Wight); W. Gháts up to 5,000 ft. in Anamalais (Barber).
A very minute twining plant, often found on other species like *U. Wallichiana*, the flowers blue.
 12. *UTRICULARIA BIFIDA*, Linn.; F. B. I. iv. 332; Bot. Mag. t. 6689.
Deccan and Carnatic, Kambakam Hills of Chingleput (Bourne, etc.), hills of Cuddapah at 2,500 ft.; S. Travancore, in wet places (Bourdillon).
An erect rigid slender herb with yellow flowers, filiform leaves and 2-horned small bladders on threads at their bases.
 13. *UTRICULARIA WALLICHIANA*, Wt. Ic. t. 1572, fig. 1; F. B. I. iv. 332.
Deccan, in hilly country in Salem and Coimbatore above 1,000 ft.; W. Gháts, in all Districts up to 7,000 ft., in bogs and other wet places, common.
A very slender twining plant with yellow flowers and linear evanescent leaves.
- Var. *macrolepis*, Gamble. *U. macrolepis*, Wt. Ic. t. 1580, fig. 2 *excl. seeds*.
Tinnevelly and S. Travancore (Wight).
Scales on the stem comparatively large, ovate, acute.

14. *UTRICULARIA CAERULEA*, Linn.; Wt. Ic. t. 1583. *U. racemosa*, Wall.; F. B. I. iv. 333. *U. nivea*, Vahl; Wt. Ic. t. 1582.
N. Circars, in Ganjam (Gamble); Deccan, Seshachalam Hills of Cuddapah, at 2,500 ft. (Gamble); W. Ghâts, Anamalais, Pulneys and hills of Travancore, up to 7,000 ft.; Shevaroy Hills of Salem; always in swampy places.
A very slender plant with flowers from white to purple, nearly sessile on the scape, the leaves short and spatulate with minute bladders. The very small form with few usually white flowers is var. *filicaulis*, C. B. Clarke.
15. *UTRICULARIA ROSEO-PURPUREA*, Stapf in Herb. Kew. *U. rosea*, C. B. Clarke; F. B. I. iv. 333, *not of* Edgw.
W. Ghâts, Anamalais, Pulneys and hills of Travancore, to 7,000 ft., in swamps.
A slender plant with dark purple (Trimen) or sometimes apparently pinkish flowers, rather large, the leaves rather short and spatulate.
16. *UTRICULARIA STRIATULA*, Sm. *U. orbiculata*, Wall.; F. B. I. iv. 334. *U. glochidiata*, Wt. Ic. t. 1581.
N. Circars, Mahendragiri Hill, Ganjam, 4,000 ft. (Fischer); W. Ghâts, in almost all Districts from S. Canara and Mysore to Tinnevely, above 3,000 ft., on wet rocks; Shevaroy Hills of Salem (Bourne).
A small very pretty slender herb with persistent leaves, filiform stolons bearing many small bladders, and flowers with the upper lip of the corolla white, the lower white with lilac margins and yellow in the throat.

Family CX. GESNERIACEAE.

Herbs or undershrubs, sometimes epiphytic. *Leaves* opposite alternate or solitary, entire or toothed; stipules 0. *Flowers* hermaphrodite, usually irregular, or axillary on terminal peduncles rarely 1-flowered; bracts present; bracteoles usually small. *Calyx* of 5 lobes, valvate or open rarely imbricate. *Corolla* gamopetalous, tubular, more or less 2-labiate; lobes 5. *Stamens* on the corolla-tube, usually didynamous, sometimes 5, often only 2 perfect; anthers 2- or by confluence 1-celled, usually connate in pairs. *Disk* annular or cylindric or 0. *Ovary* 1- or imperfectly 2-celled; ovules numerous on bifid parietal sometimes subconfluent placentas; style linear; stigma capitate or 2-lobed. *Fruit* a 2-valved capsule or a berry; placentas parietal. *Seeds* very many, small, sometimes tipped with long hairs, sometimes with a longish funicle; testa usually reticulate; albumen scanty or 0; embryo straight.

Seeds tipped with one or more hairs from near the hilum, one from the apex; epiphytic undershrubs with fleshy or leathery leaves.....1. *Aeschynanthus*.
Seeds not tipped with hairs:—

Fruit a loculicidal 2-valved capsule; placentas deeply intruded:—

Capsule linear, subfollicular; stamens 2 perfect.....2. *Didymocarpus*.

Capsule ellipsoid or ovoid:—

Erect herbs with blue flowers and leaves with unequal bases:—

Stamens 4 perfect.....3. *Klugia*.

Stamens 2 perfect.....	4. <i>Rhyncoglossum</i> .
Scapigerous herbs with 4 perfect stamens.....	5. <i>Jerdonia</i> .
Fruit a capsule dehiscing circumscissily; succulent herb with flowers in heads.....	6. <i>Epithema</i> .
Fruit a berry with large placentas; undershrub with small flowers and 4 perfect stamens.....	7. <i>Isanthera</i> .

1. *Aeschynanthus*, Jack.

Epiphytic undershrubs, the stems often rooting at the nodes. *Leaves* opposite, fleshy or leathery, usually entire, the nerves obscure but sometimes apparent in dry specimens. *Flowers* often showy, in fascicles on terminal or axillary peduncles, rarely solitary; bracts usually small but sometimes large and coloured, deciduous; bracteoles small. *Calyx* 5-fid or 5-partite. *Corolla* tubular-ventricose, usually large and curved, the limb bilabiate, the upper lip of 2 small, the lower of 3 larger lobes. *Stamens* usually 4 perfect, with sometimes a rudimentary fifth, anthers 2 oblong, usually connate in pairs by their tips. *Disk* annular. *Ovary* superior, oblong or linear, stipitate; placentas naked on the inner face, bearing ovules on the involute margin; stigma dilated. *Fruit* a long linear capsule, loculicidally 2-valved, the valves with placentas recurved at the margins. *Seeds* very many, small, oblong or linear, with 1 or more hairs at the end near the hilum and 1 at the apex; albumen 0; cotyledons very small.

Leaves linear-lanceolate, acuminate at apex, acute or somewhat rounded at base, up to 4.5 in. long, .75 in. broad, the nerves, about 5—6 pairs (apparent when dry), very oblique; calyx-lobes linear, 2—3 in. long; corolla curved, glabrous without except the ciliate lobes, about 1.25 in. long.....1. *Perrottetii*. Leaves elliptic or elliptic-lanceolate, acute, up to 2.5 or even 3 in. long, 1 in. broad, the nerves (when visible) about 5 pairs, spreading and not very oblique; calyx-lobes linear, .5 in. long; corolla slightly curved, pubescent without, the lobes glandular-ciliate, 1.3—1.5 in. long.....2. *planiculmis*.

1. *AESCHYNANTHUS PERROTTETII*, A. DC.; F. B. I. iv. 339.

W. Ghâts, in all Districts, at 4,000—7,000 ft., on trees and rocks in moist forests.

An epiphyte with distant narrow leaves on smooth branches swollen at the nodes and there giving out rootlets. The flowers are handsome, scarlet with purple lines or spots on the lobes and the long papery capsules have seeds with one long hair at each end. *Ae. ceylanica* var. *pinguis*, C. B. Clarke, seems to be only a small form of this with thicker leaves.

2. *AESCHYNANTHUS PLANICULMIS*, Gamble n. comb. *Aeschynanthus Perrottetii*, A. DC., var. *planiculmis* (by error *platyculmis*), C. B. Clarke; F. B. I. iv. 340. *Ae. ceylanica*, Wt. Ic. t. 1347, not of Gardn.

W. Ghâts, hills of Tinnevely above 4,000 ft., in damp forests. An epiphyte with thick flattened stems and close rather broad fleshy leaves, the nodes giving out rootlets. The handsome flowers, larger than those of the former species, are also, apparently, scarlet and spotted, and the capsules and seeds are similar. It is doubtfully distinct.

2. *Didymocarpus*, Wall.

Herbs, rarely undershrubs, erect scapigerous or creeping. *Leaves* opposite alternate or crowded, rarely solitary. *Flowers* axillary, fascicled or pedunculate, cymose subumbellate or racemose with the pedicels in pairs; bracts small. *Calyx* small. 5-fid or 5-partite, the lobes narrow. *Corolla* tubular or campanulate, often ventricose, the mouth often oblique; lobes 5, rounded. *Stamens* included, the 2 anterior perfect, the anthers connate in pairs, the posterior 2 or 3 reduced to staminodes, rarely 4 perfect. *Disk* cylindric or 0. *Ovary* narrow, 1-celled, sessile or stipitate; placentas intruded and then recurved bearing the numerous ovules; style long or short; stigma peltate, emarginate or subcapitate, rarely 2-lobed. *Fruit* a linear rarely lanceolate capsule loculicidally 2-valved or follicular, bearing seeds on the back of the placenta lobes. *Seeds* very many, minute, ellipsoid or subtrigonal, the testa pitted or waved or reticulate.

Very small herb with short stem and only one very thin leaf, ovate-cordate, obtuse, entire, sessile, pilose, the nerves 8—9 pairs chiefly from near the base and prominently arching upwards; flower-pedicels few, fascicled in the leaf-axils; calyx-lobes linear, 1—2 in. long; corolla tubular-funnel-shaped, 3 in. long; capsule 5—7 in. long, pilose.....1. *pygmaea*.
Trailing silvery-pilose herb with stems rooting at intervals, the nodes bearing each one long-petioled orbicular cordate leaf and a rather longer peduncle with a few flowers; the leaf up to about 4 in. in diam. and doubly crenate, the nerves about 6—7 pairs chiefly from the base and arching upwards; calyx-lobes linear, 2 in. long; corolla tubular, curved upwards, 5—75 in. long; capsule slender, 1 in. long, pubescent.....2. *repens*.
Scapigerous herbs, the leaves in a basal rosette:—

All the leaves with simple petioles not winged or broadened:—

Leaves entire, membranous, ovate, subacute, rounded at base, white-pellucid hairy, up to 4 in. long, 2 in. broad, nerves obscure, about 5 pairs, petiole up to 4 in. long; scapes 8—12 in. long, slender, with many flowers in racemes; calyx-lobes linear, 2 in. long; corolla funnel-shaped, 7—1 in. long; capsule slender, 1—1.25 in. long, glabrous.....3. *missionis*.
Leaves regularly shallowly crenate-serrate, elliptic-ovate, obtuse, white-strigose, up to 3 in. long, 2 in. broad, nerves prominent, 8—12 pairs, petiole up to 4 in. long; scapes up to 4 in., umbellately 2—6-flowered; calyx-lobes lanceolate, 2 in. long; corolla tubular ventricose, 75 in. long; capsule slender, 1 in. long, pubescent.....4. *acutifolia*.

Older leaves with elongate petioles, winged and more or less lacerate, the younger and central leaves subsessile, more woolly:—

Petioles up to 6 in. long, ineiso-pinnatifid, the blades membranous, ovate, lobulate, the lobes irregularly crenate, both surfaces softly villous, up to 3 in. long, 2 in. broad, nerves about 5 pairs, much branched; scapes slender, subcorymbose, many-flowered, up to 6 in. long, softly villous; corolla small, tubular-ventricose; capsule 5 in. long, erect, pubescent.....5. *lyrata*.
Petioles up to 5 in. long, narrowly winged, the wings scarcely lacerate, the blades membranous, ovate, obtuse at apex, narrowed at base, prominently crenate, up to 4 in. long, 2.5 in. broad, nerves 5—7 pairs, prominent beneath and branched; scapes slender, up to 10 in. long in fruit; corolla ventricose, 75 in. long; capsule up to 1.5 in. long, oblique, glabrous.....6. *Meeboldii*.
Petioles up to 2 in. long, narrowly winged, the blades ovate, obtuse at apex, rounded or subcordate at base, crenate, up to 3 in. long, 2 in. broad, nerves 4—6 pairs; scapes slender, up to 7 in. long; corolla tubular-ventricose, about 5 in. long; capsule up to 1.5 in. long, oblique, pubescent.....7. *Humboldtiana*.

Older leaves with short petioles, broadened or winged, not lacerate, the younger and central leaves sessile or nearly so:—

Crenatures of the leaves broad and deep, irregular, leaves rather thin, spathu-

late, the blade broadly decurrent on the petiole, bullate and with tufts of white hair, up to 6 in. long, 2·5—3 in. broad:—

Scape-peduncles about 4 in. long, slender, dichotomously branching several times to lax corymbs about 4 in. in diam.; corolla small, oblique at the mouth, 3—4 in. long; capsule slender, 5—8 in. long, very acuminate, villous.....8. *Rotleriana*.

Scape-peduncles up to 10 in. long, stout, once dichotomously branching in few-flowered racemes elongating in fruit; corolla broadly campanulate and slightly ventricose, wide at the mouth, 5 in. long; capsule stout, shortly acute, up to 1·25 in. long, slightly villous.....9. *Fischeri*.

Crenatures of the leaves shallow; leaves thick, the blade ovate or orbicular, broadly decurrent on the short petiole, bullate and thickly tufted with white silky hair, rarely over 3 in. long:—

Petiole about 25 in. broad; crenatures irregular; scapes many stout, the peduncles up to 6 in. long, dichotomously branching in corymbs up to 2 in. in diam.; corolla campanulate, curved, the mouth wide, 5 in. long; capsule 1 in. long, villous.....10. *tomentosa*.

Petiole up to 75 in. broad; crenatures regular; scapes few, the peduncles up to 7 in. long, branching in elongate racemes; corolla up to 4 in. long, campanulate, the mouth very oblique; capsule 75—1 in. long, thickly crispate villous.....11. *lanuginosa*.

Crenatures scarcely any; leaves thick, densely white woolly, obovate-spathulate, up to 2 in. long; scapes under 4 in. long, ending in few-flowered drooping cymes; corolla small, curved, wide at the mouth, scarcely 25 in. long; capsule lanceolate-acuminate, 4 in. long.....12. *Wightii*.

1. *DIDYMOCARPUS PYGMAEA*, C. B. Clarke; F. B. I. iv. 345.

N. Circars, Rampa Hills (V. Narainswami) and Bison Hills (Barber) in Godavari, in crevices of rocks in damp places, usually above 2,000 ft.

A very delicate hyaline-pilose little plant with only one leaf, sessile on a short weak stem up to 3 in. long and up to about 2·5 in. long, 2 in. broad, the corolla apparently pinkish, the seeds somewhat trigonous, the sides with about 5 transverse depressions.

2. *DIDYMOCARPUS REPENS*, Bedd. Ic. t. 120; F. B. I. iv. 354.

W. Gháts, hills of Tinnevely and Travancore, in moist forests at 1,000—3,000 ft. (Beddome, Bourdillon, Barber).

A creeping herb with blue flowers rather wide at the mouth, and dilated filaments, the seeds somewhat trigonous, minutely reticulate.

3. *DIDYMOCARPUS MISSIONIS*, Wall.; F. B. I. iv. 354. *D. membranacea*, Bedd. Ic. t. 176.

W. Gháts, Pachemalai Hills of S. Travancore at 2,000 ft., on moist rocks, rare (Beddome).

A delicate scapigerous stellately white-hairy herb, the flowers pale blue, the seeds angular, scurfy.

4. *DIDYMOCARPUS OVALIFOLIA*, Wt. Ic. t. 1351; F. B. I. iv. 354.

W. Gháts, hills of Tinnevely, about 3,000 ft.

A pretty species with large prominently ventricose flowers, said to be "blue-yellow" (Wt.), probably blue with a yellow throat, the seeds ellipsoid, flattened on one side, minutely scaly.

5. *DIDYMOCARPUS LYRATA*, Wt. Ic. t. 1350; F. B. I. iv. 353.

Tinnevely Hills, about Courtallum, in moist shady places (Wight).

- A softly villous herb with lyrate leaves and small flowers, the seeds oblong, minutely reticulate.
6. *DIDYMOCARPUS MEEBOLDII*, Sm. & Ramas. in Rec. Bot. Surv. Ind. vi. 43.
W. Gháts, hills of Madura and Travancore, about 3,000 ft., at Peermade Ghát (Meebold).
A scapigerous herb with thin leaves, the older white-pilose especially on the nerves, the younger softly rusty-villous, the flowers (probably) pale blue with yellow tube, the seeds subtrigonus minutely pitted.
 7. *DIDYMOCARPUS HUMBOLDTIANA*, Gardn. ; F. B. I. iv. 353.
W. Gháts, Nilgiris, near Coonoor (Bourne, Gamble) and Pulneys (Bourne) at about 6,000 ft., on rocks.
A scapigerous herb with pale lilac flowers.
 8. *DIDYMOCARPUS ROTTLERIANA*, Wall. ; F. B. I. iv. 353.
W. Gháts, hills of Tinnevely and Travancore, at 2,000—3,000 ft.
A large scapigerous herb with many scapes and purple flowers, yellow in the throat, the seeds boat-shaped, rough.
 9. *DIDYMOCARPUS FISCHERI*, Gamble in Kew Bull. 1923, 117.
W. Gháts, Anamalai Hills at 1,700 ft. (Fischer).
A large and handsome species.
 10. *DIDYMOCARPUS TOMENTOSA*, Wt. Ic. t. 1349 ; F. B. I. iv. 353.
Deccan, Veligonda Hills of Nellore (Ramaswami), hills of N. Coimbatore at 4,000 ft. (Fischer) ; Carnatic, Kollimalai Hills of Trichinopoly (Barber) ; W. Gháts, Nilgiris, Anamalais, Pulneys and hills of Madura and Tinnevely, 3,000—6,000 ft., on rocks.
A scapigerous herb with bluish-purple flowers, the seeds subtrigonus, pitted minutely.
 11. *DIDYMOCARPUS LANUGINOSA*, Wt., *not of* Wall. *D. tomentosa* var. *lanuginosa*, C. B. Clarke ; F. B. I. iv. 353.
W. Gháts, hills of Madura and Tinnevely (Wight).
A scapigerous herb with thick cinnamomeous-tomentose leaves.
 12. *DIDYMOCARPUS WIGHTII*, Gamble n. comb. *D. Rottleriana* var. *Wightii*, C. B. Clarke ; F. B. I. iv. 353. *D. Rottleriana*, Wt. Ic. t. 1348, *not of* Wall.
Sivagiri Hills of Tinnevely (Wight), apparently very rare.
A small plant with very white woolly leaves.

3. *Klugia*, Schlecht.

Herbs, the stems rooting near the base, then erect, somewhat succulent. *Leaves* alternate, unequal-sided at base, the lower side cordate, subentire or sinuate, many-nerved. *Flowers* in terminal or leaf-opposed many-flowered racemes ; bracts minute or 0 ; bracteoles very small, linear. *Calyx* campanulate, 5-angled or -winged, one wing often large ; lobes 5. *Corolla*-tube cylindric, limb 2-lipped, the upper very small, the lower broad, rounded or shortly 3-lobed, with 2 hooded depressions at base. *Stamens* 4 perfect, included, inserted above the middle of the tube ; anthers 2-celled, approximate in pairs. *Disk* fleshy, annular or cylindric. *Ovary* ovoid, many-ovuled ; style slender ; stigma obscurely 2-lobed. *Fruit* a loculicidal 2-valved ovoid capsule, the

placentas divided into 2 thick plates, bearing seeds all over. *Seeds* ellipsoid, minute, testa reticulate.

KLUGIA NOTONIANA, A. DC. ; F. B. I. iv. 366 ; Wt. Ic. t. 1353.

W. Gháts, all Districts, above 3,000 ft., in damp places in evergreen forests.

A nearly succulent annual herb reaching 2 ft. in height, with rather large flowers, white in the tube, the large lower lip bright blue with yellow near the cavities at the base; leaves very unequal-sided with many prominent parallel curved nerves, up to 8 in. or more long, 4 in. broad, glabrous or scabrid-pubescent.

4. *Rhyncoglossum*, Blume.

Herbs, usually glabrous. *Leaves* alternate, unequal-sided at base, the lower side cordate, entire or sinuate. *Flowers* in long many-flowered racemes; bracts 0; bracteoles minute. *Calyx* campanulate, 5-lobed. *Corolla*-tube cylindric, contracted at the mouth; limb 2-lipped, the upper short bifid, the lower longer, 3-lobed. *Stamens* 2 perfect included, the anthers 2-celled connivent; the others reduced to staminodes. *Disk* shortly cylindric. *Ovary* ovoid, glabrous, 1-celled; placentas intruded, of 2 thick plates bearing numerous ovules on all sides; style linear; stigma minutely 2-lobed. *Fruit* a membranous loculicidal 2-valved capsule. *Seeds* minute, ellipsoid; testa reticulate.

RHYNCOGLOSSUM OBLIQUUM, Bl. ; F. B. I. iv. 367. Var. *parviflora*, C. B. Clarke.

N. Circars, Mahendragiri Hill, Ganjam, 4,000 ft. (Fischer); W. Coast and W. Gháts from S. Canara to Cochin, up to 3,000 ft., in damp places in evergreen forests.

A succulent herb with blue flowers, similar to *Klugia Notoniana* but usually smaller and with the calyx not winged. Leaves oblong lanceolate acuminate, parallel-nerved, very unequal at base.

5. *Jerdonia*, Wight.

A scapigerous herb, from a thick scarred root-stock. *Leaves* crowded at the base, elliptic, reticulate, long-petioled. *Flowers* in slender few-flowered scapes; bracts small. *Calyx* 5-partite, the lobes lanceolate, long-pilose. *Corolla*-tube elongate, swollen upwards; limb oblique, 2-lipped, upper lip emarginate, lower 3-lobed. *Stamens* 4 perfect; filaments dilated, the lower pair with a descending spur; anthers 2-celled, cohering at their apices. *Disk* cup-shaped. *Ovary* ovoid; placentas 2, each of 2 flat plates bearing ovules on both faces; style linear; stigma peltate. *Fruit* an ovoid, loculicidal, 2-valved villous capsule with 4 many-seeded placentas. *Seeds* funicled, ellipsoid, grooved at the sides.

JERDONIA INDICA, Wt. Ic. t. 1352 ; F. B. I. iv. 368.

W. Gháts, Nilgiri and Anamalai Hills, at about 3,000 ft., in damp evergreen forests; Bolampatti Hills of Coimbatore.

A scapigerous herb with pale lilac corolla marked with red lines, and long petioled rusty-villous leaves up to 2.5 in. long, 2 in. broad, with about 5 pairs of arching nerves and prominent reticulation.

6. *Epithema*, Blume.

Small succulent pubescent herbs; stem simple or branched. *Leaves* few, alternate or opposite. *Flowers* small, in dense pedunculate scorpioid cymes; bract large, solitary, hooded or subspathaceous; bracteoles small, narrow; pedicels very short. *Calyx* campanulate; lobes 5, acute, valvate in bud. *Corolla* small, tubular, 2-lipped, lobes 5, subequal. *Stamens* 4, 2 upper perfect, the anthers 2-celled, cohering, the cells short, soon confluent; 2 lower reduced to staminodes. *Disk* one-sided. *Ovary* ovoid, 1-celled; placentas parietal, stalked, peltate, with ovules on all sides; style filiform; stigma small. *Fruit* a globose membranous capsule included in the calyx and dehiscing circumscissly; placentas T-shaped. *Seeds* very numerous, on slender funicles, oblong, acute at both ends: testa usually spirally striate.

EPITHEMA CARNOSUM, Benth.; F. B. I. iv. 369. Var. *hispida*, C. B. Clarke. *E. ceylanicum*, Wt. Ic. t. 1354, not of Gardn.

W. Ghâts, Nilgiris to Tinnevely Hills, on shaded rocks, at low levels.

A small herb with bluish flowers and leaves of variable size sometimes up to 5 in. in diam. and broadly ovate cordate.

7. *Isanthera*, Nees.

Small undershrubs; almost all parts tawny-silkily woolly. *Leaves* alternate, large, oblanceolate, long-petioled. *Flowers* in axillary peduncled cymes towards the end of the stem; bracts narrow. *Calyx* of 5 narrow lobes extending nearly to the base. *Corolla* small, shortly campanulate, scarcely 2-lipped; lobes 5, ovate. *Stamens* 4 perfect, adnate to the base of the corolla; filaments short; anthers 1-celled, dehiscing marginally, in an arch; staminodes usually absent. *Disk* small, annular. *Ovary* ovoid; placentas 2, recurved and bearing many ovules; style short; stigma small, capitate. *Fruit* an ovoid fleshy indehiscent berry; placentas large, the margin recurved vertically. *Seeds* very small, ellipsoid; testa smooth or slightly wrinkled.

ISANTHERA PERMOLLIS, Nees; F. B. I. iv. 372; Wt. Ic. t. 1355.

W. Ghâts, S. E. Wynaad and Malabar slopes at 2,000–3,000 ft.; hills of Tinnevely, in moist places in evergreen forests.

An erect undershrub with smooth pale brown bark under soft tawny wool, small white flowers and large softly tawny-villous leaves up to 10 in. long, 4 in. broad, long decurrent on a long petiole, the conspicuous parallel nerves about 20 pairs.

Family CXI. BIGNONIACEAE.

Trees or shrubs, sometimes climbing, rarely herbs. *Leaves* opposite, rarely alternate or whorled, 1–3 times odd-pinnate, very rarely simple; leaflets entire or sometimes toothed. *Flowers* hermaphrodite, irregular, in racemes or panicles usually terminal, often large and showy; bracts various. *Calyx* gamosepalous, campanulate or spathaceous; lobes 2–5 or 0, valvate. *Corolla* 2-lipped, tubular-ventricose; lobes 5, subequal, imbricate in bud. *Stamens* 4, didynamous, with often

a 5th usually imperfect, rarely perfect; inserted where the corolla-tube is suddenly swollen; filaments glabrous or hairy at base; anthers 2-celled, the cells parallel or divergent, dehiscing longitudinally. Disk usually thick or annular. Ovary subsessile, 2-celled; ovules numerous, in many rows, anatropous; style long, glabrous; stigma of 2 elliptic lobes. Fruit a usually elongate loculicidally or septicidally 2-valved capsule, the septum enlarging, deciduous with the placentas. Seeds compressed, discoid or trigonous, usually prominently winged, the embryo in an interior membranous testa; albumen 0; cotyledons flattened, sometimes folded.

Perfect stamens 5; a tree with 2—3-pinnate leaves and very large flat capsules

1. *Oroxylum*.

Perfect stamens 4; trees:—

Anther-cells 1 perfect, 1 reduced to a small hook; a tall tree with 2—3-pinnate leaves and very long linear corolla-tube.....2. *Millingtonia*.

Anther-cells 2, both perfect:—

Capsule not winged, cylindric flattened or subquadrangular:—

Calyx spathaceous, split on one side; corolla-tube slender, lobes spreading, crisped on the margins.....3. *Dolichandrone*.

Calyx not spathaceous; corolla-tube ventricose:—

Capsule with a flat or angular septum.....4. *Heterophragma*.

Capsule with a cylindric spongy septum:—

Septum prominently pitted, the seeds trigonous, transversely grooved without, the inner edge fitting into the pit; ovules 2-seriate in each cell

5. *Stereospermum*.

Septum only faintly pitted, the seeds flat; ovules many-seriate in each cell.....6. *Radermachera*.

Capsule winged on both margins, the septum flat; a large tree with large flowers and large pinnate leaves.....7. *Pajanelia*.

1. *Oroxylum*, Vent.

A glabrous tree. Leaves large, opposite, 2—3-pinnate; leaflets entire. Flowers large, in long terminal racemes. Calyx large, leathery, campanulate, the limb truncate or obscurely toothed. Corolla large, fleshy, campanulate; lobes 5, subequal, crisped. Stamens 5 perfect, the posterior one the shortest; filaments inserted near the base of the tube; anthers 2-celled, the cells parallel, oblong. Disk large, cushion-like. Ovary subsessile, contracted at the base, compressed; ovules very many; style slender; stigma 2-lobed. Fruit a very large broadly linear septicfragally 2-valved capsule, compressed parallel to the septum. Seeds very many, flattened, surrounded by a broad hyaline papery wing; cotyledons emarginate.

OROXYLUM INDICUM, Vent.; F. B. I. iv. 378. *Calosanthes indica*, Bl.; Wt. Ic. t. 1337.

Most Forest Districts, chiefly in moist places in deciduous forest; in evergreen forests in Travancore (Bourdillon) up to 2,000 ft.

A small conspicuous but ungainly tree, at once known by the 2—3-pinnate large leaves and the flat capsule, which may reach 3 ft. in length. Bark light brownish-grey, greenish when cut; wood yellowish-white, soft, not used. Vern. Hind. Ullu, Sauna; Ur. Poinponia; Tel. Pampini, Pampana; Tam. Achi, Pana, Pei; Mal. Palaga-paiyani; Kan. Bunepalé.

2. *Millingtonia*, Linn. f.

A tall tree with corky bark. *Leaves* opposite, 2—3-pinnate, the leaflets entire or crenate. *Flowers* in terminal corymbose panicles. *Calyx* small, campanulate, truncate or with 5 short teeth. *Corolla* white; tube long, slender; limb obscurely bilabiate; lobes 5, subequal. *Stamens* 4, didynamous, shortly exsert; anthers 1-celled, the second cell rudimentary, hooked. *Disk* annular. *Ovary* subsessile, cylindric-conical; ovules many 1- or more-seriate; style slender; stigma 2-lobed. *Fruit* an elongate linear capsule compressed parallel to the septum, septicidally 2-valved. *Seeds* very many, flattened, with a broad hyaline wing.

MILLINGTONIA HORTENSIS, Linn. f.; F. B. I. iv. 377; Bedd. Fl. t. 249 (except anthers). *Bignonia suberosa*, Roxb. Cor. Pl. t. 214.

Plains Districts, planted in avenues and gardens and often found run wild. It is said to have come from Burma. Indian Cork Tree.

A tall handsome tree with sweet-scented flowers. Bark thick corky; wood soft, yellowish-white, likely to be useful as a "deal." The tree reproduces well both by seed and by suckers. Vern. *Hind.* Akao-nim'; *Tam.* Kat malli; *Tel.* Kavuki.

3. *Dolichandrone*, Fenzl.

Trees. *Leaves* opposite, pinnate, the leaflets entire or obscurely toothed. *Flowers* few, opening at night, usually white, large or moderate-sized, in terminal corymbs or panicles. *Calyx* spathaceous, cleft to the base on one side. *Corolla*-tube long or short; lobes 5, nearly equal, crisped on the margin. *Stamens* 4, didynamous, included; anthers glabrous, the cells parallel. *Disk* annular. *Ovary* sessile; ovules numerous, many-seriate; style long; stigma 2-lobed. *Fruit* a long subterete or compressed capsule, loculicidally 2-valved; the septum narrow with a transverse false septum, making seemingly 4 cells. *Seeds* much compressed, almost rectangular, with broad wings on each side; cotyledons usually broader than long, emarginate.

Corolla 4—7 in. long, the tube long and slender below, widening after half-way in a funnel, the lobes spreading up to a 4 in. broad mouth; calyx spathe abruptly acuminate at apex; leaves with 5—9 acuminate rhomboid leaflets up to 4 in. long, unequal at base; capsule straight, up to 18 in. long, 1 in. broad, the seeds with corky wings.....1. *spathacea*.

Corolla under 3 in. long, the tube slender below slightly widening, the mouth about 2 in. in diam.; seeds with membranous wings:—

Corolla more than 1.5 in. long, usually 2 in.; calyx-spathe with a recurved point; capsule arcuate with conspicuous speckles, only slightly compressed, 12 in. or more long:—

Glabrous or nearly so, leaflets usually 5 rarely 7, ovate, acuminate, nerves about 5—7 pairs, petiolules 3—6 in. long, that of end-leaflet longer.....2. *atrovirens*.

Pubescent or subfloccose, leaflets usually 5 or 7, sometimes up to 11, ovate or orbicular, obtuse or with a short point, nerves about 5—6 pairs, petiolules 1—3 in. long, that of end leaflet longer.....3. *arcuata*.

Corolla less than 1.5 in. long, calyx-spathe obtuse or emarginate; capsule falcately curved, much flattened, without speckles but minutely striate, up to about 21 in. long, .75 in. broad; leaflets usually 7, orbicular obovate or even obcordate, with a small point, except in var. *Lawii*, grey-pubescent, up to 1.5 in. in diam. but usually much smaller.....4. *falcata*.

1. *DOLICHANDRONE SPATHACEA*, K. Schum.; Sprague in Kew Bull. 1919, 304. *D. Rheedii*, Seem.; F. B. I. iv. 379. *Spathodea Rheedii*, Wall.; Wt. Ic. t. 1339.
W. Coast, S. Canara to Travancore, on the banks of rivers and backwaters.
A moderate-sized deciduous tree with beautiful white flowers which are open at night and then fall off. Wood white, soft. Vern. *Tam.* Vilpadri; *Mal.* Nir pongilium.
2. *DOLICHANDRONE ATROVIRENS*, Sprague in Kew Bull. 1919, 304. *D. crispa*, Seem.; F. B. I. iv. 379.
Deccan, in the Ceded Districts, eastwards to the hills of Nellore, south to Tinnevely and S. Travancore, in dry deciduous forests, up to 3,000 ft.
A moderate-sized tree with pretty white flowers. Bark brown, rough; wood yellowish-brown, useful. Vern. *Tel.* Nironddi; *Tam.* Pumbadri.
3. *DOLICHANDRONE ARCUATA*, C. B. Clarke; F. B. I. iv. 380. *Spathodea arcuata*, Wt. Ic. t. 1340.
Deccan, in Kurnool, Mysore and Coimbatore, in dry deciduous forest, west to Palghat.
A moderate-sized tree, with flowers rather larger than in the last. Bark brown, peeling off in flakes; wood white. Vern. *Tam.* Ran palai.
4. *DOLICHANDRONE FALCATA*, Seem.; F. B. I. iv. 380. *Bignonia spathacea*, Roxb. Cor. Pl. t. 144. *Spathodea falcata*, Wall.; Bedd. Fl. t. 71.
N. Circars, in Vizagapatam and Upper Godavari; Deccan, in Hyderabad, Mysore, and all other Districts; Carnatic, Nellore to S. Arcot, Shevaroy Hills, Sirumalai Hills in Madura, in dry deciduous forests, often on rocky slopes.
A small deciduous tree with white flowers. Bark bluish grey, exfoliating in scales; wood white, hard and close-grained, useful. Vern. *Tel.* Udda, Wodi, Chittivadi; *Tam.* Katuvarsana; *Kan.* Wudige.
Var. *Lawii*, Sprague in Kew Bull. 1919, 308. Nearly or quite glabrous, the leaflets more ovate, with a short point and not emarginate, the nerves 5 pairs.
Dry forest lands in Cuddapah (Gamble).

4. *Heterophragma*, DC.

Trees. *Leaves* large, pinnate. *Flowers* large, in terminal woolly panicles. *Calyx* ovoid and closed when young, afterwards campanulate, irregularly 3—5-lobed. *Corolla* tubular-ventricose, rose white or yellow, glabrous or tomentose without; lobes 5, rounded, subequal. *Stamens* 4, didynamous, included; anthers glabrous, the cells linear-oblong, diverging. *Disk* cushion-shaped. *Ovary* sessile; ovules numerous, many-seriate on each placenta; style long; stigma 2-lobed. *Fruit* an elongate cylindric or more or less compressed, falcate or twisted, loculicidally 2-valved, capsule, the dissepiment flat or 4-angular. *Seeds* compressed, with a membranous wing at each end.

HETEROPHRAGMA ROXBURGHII, DC.; F. B. I. iv. 381. *Bignonia quadrilocularis*, Roxb. Cor. Pl. t. 145.

N. Circars, forests of the Godavari banks at low levels; W. Gháts, hills of S. Canara, in deciduous forest areas.

A large tree with fragrant rose-coloured flowers, densely tomentose calyx, imparipinnate leaves with 7—11 leaflets and narrowly oblong capsules up to 1 ft. long. Wood yellowish-white, hard. Vern. *Tel.* Bondgu; *Tam.* Baro-kala-goru.

H. adenophyllum, Seem., is a Burmese species with large brownish-yellow flowers frequently found in gardens in cultivation.

5. *Stereospermum*, Cham.

Trees. *Leaves* opposite, imparipinnate; leaflets entire or toothed. *Flowers* in large lax terminal panicles. *Calyx* campanulate, truncate or shortly and unequally 5-lobed. *Corolla* tubular-campanulate, curved, 2-lipped, the upper lip 2- the lower 3-lobed; lobes nearly equal, rounded crisped toothed or lacinate. *Stamens* 4 didynamous with a 5th rudimentary, included; anthers glabrous, the cells divergent. *Ovary* sessile, elongate, 2-celled; ovules numerous, biseriate in each cell; style slender; stigmas 2. *Disk* cupular, fleshy. *Fruit* an elongate terete or 4-angled capsule, loculicidally 2-valved; septum thick, corky, cylindrical, pitted in alternating cavities to receive the seeds, the wings of which lie flat along it. *Seeds* trigonous, with a transverse groove without and a prominent ridge within; cotyledons folded, 2-lobed; radicle straight.

Filaments of the stamens with a tuft of woolly hair at the base; leaves and panicles nearly or quite glabrous, the leaflets elliptic, suddenly and long caudate-acuminate at apex; capsule slender, somewhat spirally twisted, 4-angled

1. *tetragonum*.

Filaments of the stamens without a tuft of woolly hair at the base though sometimes villous; leaves and panicles more or less pubescent:—

Petiolules of leaflets very short, scarcely 1 in. long, leaflets broadly elliptic, shortly abruptly acuminate, often serrulate when young, rough; capsule rather stout, nearly terete, lenticellate, usually straight.....2. *suaveolens*.
Petiolules of leaflets longer, up to 4 in. long, leaflets oblong or oblong-lanceolate, acuminate, pubescent beneath even when old; capsule slender, terete, lenticellate, often curved.....3. *angustifolium*.

1. STEREOSPERMUM TETRAGONUM, DC. *S. chelonoides*, C. B. Clarke, F. B. I. iv. 382; Wt. Ic. t. 1341; Bedd. Fl. t. 72, not of DC.

Deccan, Nallamalai Hills, Veligonda Hills of Nellore (Ramawami); W. Gháts, in all Districts, up to about 3,000 ft., chiefly in deciduous forests.

A large tree with yellow flowers veined with red, the capsules up to 2 ft. long. Bark brown; wood hard, greyish brown with darker patches, very little used in S. India. Vern. *Hind.* Padri; *Ur.* Patuli; *Tel.* Pisul, Tagada; *Tam.* Vela-padri, Pombathiri; *Mal.* Karingkura.

2. STEREOSPERMUM SUAVEOLENS, DC.; F. B. I. iv. 382; Wt. Ic. t. 1342.

N. Circars and Deccan, in deciduous forests; W. Gháts, also in deciduous forests, in the hills of Mysore, Malabar and Travancore, scarce.

A large tree with dull crimson flowers, and rather thick straight capsules up to 18 in. long. Bark grey, exfoliating in flat scales;

wood hard, yellowish-brown, useful for many purposes but little used. Vern. *Hind.* Padal; *Tam.* Padri; *Tel.* Kala goru; *Mar.* Parúl; *Kan.* Billa.

3. *STEREOSPERMIUM ANGUSTIFOLIUM*, Haines in Kew Bull. 1922, 121.

N. Circars, near Vizagapatam (Barber); Deccan, Hyderabad Forests (Edwards).
A small tree.

6. *Radermachera*, Zoll. & Moritz.

Trees. *Leaves* opposite, 1—3-pinnate, leaflets petiolulate, entire. *Flowers* large, in terminal racemes, corymbs or panicles. *Calyx* campanulate, truncate or shortly lobed. *Corolla* funnel-shaped or campanulate; tube short; limb sub-bilabiate, the lobes spreading, rounded. *Stamens* 4, didynamous, with a rudimentary fifth, included; filaments slender; anther-cells divaricate. *Ovary* cylindrical, 2-celled; ovules very numerous, in many rows in each cell; style slender; stigma linguiform. *Fruit* an elongate, often twisted capsule; valves 2, woody; septum spongy, faintly pitted and bearing on each side a double row of seeds. *Seeds* small, flat, with a membranous wing at each end; cotyledons flat, not folded; internal testa thin; radicle minute.

RADERMACHERA XYLOCARPA, K. Schum. *Stereospermum xylocarpum*, Benth. & Hook. f.; F. B. I. iv. 383. *Bignonia xylocarpa*, Roxb.; Wt. Ic. tt. 1335, 6; Bedd. Fl. t. 70. *Spathodea xylocarpa*, Brand. For. Fl. t. 43.

N. Circars, hills of Godavari; Deccan, hilly country as at Horsleykonda, Ramandrúg, etc., up to 4,000 ft.; W. Gháts, dry forests in all Districts.

A large deciduous tree with large bipinnate leaves, fragrant flowers in corymbs, a white corolla tinged with yellow or pink, and a long very woody cylindric prominently tubercular capsule sometimes up to 3 ft. long and 1·5 in. in diam. Bark light grey; wood very hard, orange-brown, tough, used for furniture, cart-poles and other purposes. Vern. *Tam.* Vadencarni, Pathiri; *Mar.* Khansing; *Mal.* Vedangkonnai.

7. *Pajanelia*, DC.

A tree. *Leaves* imparipinnate; leaflets numerous, entire, unequal at base. *Flowers* large, in large terminal thyrsoid panicles. *Calyx* large, ovoid, closed in bud, in flower ventricose-campanulate; lobes 5. *Corolla* large, tubular-ventricose; lobes 5, subequal, crisped on the margins. *Stamens* 4, didynamous, with a rudimentary fifth, sub-exsert; filaments slender; anther-cells linear, divergent. *Disk* annular. *Ovary* 2-celled; ovules many-seriate on each placenta; style long; stigma 2-lobed. *Fruit* a large, narrowly oblong, compressed, winged capsule, loculicidally 2-valved, the septum contrary to the valves. *Seeds* compressed, with hyaline wings; cotyledons emarginate.

PAJANELIA RHEEDII, Wt. Ic. tt. 1343, 44; F. B. I. iv. 384.

W. Coast, S. Canara to Travancore, up to 2,000 ft. in the W. Gháts forests (Beddome); much planted as a support for the pepper plant (Bourdillon).

A large deciduous tree in the forests, moderate-sized in plantations, having leaves with 13—15 large leaflets, a large capsule sometimes nearly 2 ft. long with broad wings and corollas 2·5 in. long, white in the tube, crimson-purple on the lobes (Bourd. Trees Trav. 278). Bark pale grey, shining, rough; wood sometimes used for dugout canoes in Travancore. Vern. *Tam. Aranthal*; *Mäl. Arlantha*, Payani.

Several interesting species of this Family, trees or erect or climbing shrubs, have been introduced and cultivated. The most common of these are:

Markhamia stipulata, Seem. (*Dolichandrone stipulata*, Benth. and Hook. f.; F. B. I. iv. 379), a tree from Burma, with yellowish-brown tomentose leaves and inflorescence, the corolla purple inside.

Spathodea campanulata, Beauv., a tree, introduced from Tropical Africa, with large orange-scarlet flowers, the calyx spathaceous.

Kigelia pinnata, DC., a small tree, introduced from Tropical Africa, with pendulous racemes of large red flowers and a long-stalked large gourd-like fruit.

Stenolobium stans, D. Don, a large West Indian shrub with golden-yellow flowers, common in gardens.

Pyrostegia ignea, Presl, a large climbing shrub, native of Brazil, commonly cultivated in gardens, and conspicuous for its showy racemes of orange-red flowers.

Family CXII. PEDALIACEAE.

Herbs, rarely undershrubs. *Leaves* opposite or the upper alternate, entire toothed or lobed; stipules 0. *Flowers* irregular, hermaphrodite, solitary or rarely clustered or racemose, usually axillary; bracts 0 or minute. *Calyx* usually deeply 4—5-lobed. *Corolla* tubular-ventricose; limb 5-lobed, obscurely 2-lipped; lobes imbricate. *Stamens* 4, didynamous, rarely 2. *Disk* hypogynous, fleshy. *Ovary* 2- rarely 1-celled, ovules many or few, superposed; style filiform; stigma 2-lobed. *Fruit* drupaceous or capsular. *Seeds* exalbuminous.

Flowers axillary; stamens 4, didynamous, perfect:—

Fruit indehiscent, with 4 spines on the margin; seeds 2 in each cell

	1. Pedaliium.
Fruit capsular, 2-valved, not spinous; seeds many in each cell.....	2. Sesamum.
Flowers in racemes; stamens 2 only perfect; fruit drupaceous with dehiscent pericarp and hard 2-clawed endocarp.....	Martynia.

1. *Pedaliium*, Linn.

A glabrous annual. *Leaves* opposite or alternate, repand-dentate. *Flowers* axillary, solitary, yellow; pedicels short, 2-glandular at the base. *Calyx* small, 5-partite. *Corolla*-tube slender below, enlarged above; limb sub-bilabiate; lobes 5, round, spreading. *Stamens* 4, didynamous, with a 5th rudimentary; anther-cells ovate, pendulous, opening by short slits. *Disk* large, oblique. *Ovary* 2-celled, ovules 2 in each cell; style slender; stigma 2-lobed, the lower the smaller. *Fruit* hard, indehiscent, 2-celled; the upper part ovoid obtuse above, tetragonous

below with sharp conical spines at the angles. *Seeds* 2 in each cell, superposed, pendulous, oblong; testa membranous, produced; cotyledons oblong.

PEDALIUM MUREX, Linn.; F. B. I. iv. 386; Wt. Ic. t. 1615.

E. Coast from the Chilka Lake southwards, on sandy shores; inland in the Carnatic, Coimbatore (Wight, etc.), Trichinopoly (King).

A branching sub-fleshy herb with minute glands, badly smelling, the leaves glaucous green, ovate, repand, long-petioled, the fruits spinous. The whole plant is used in medicine, and renders water or milk mucilaginous. Vern. *Ur*. Gokara; *Tam*. Anai-nerinji.

2. *Sesamum*, Linn.

Erect or prostrate herbs. *Leaves* opposite below, alternate above, entire toothed lobed or divided. *Flowers* axillary solitary or few and fascicled, shortly pedicelled. *Calyx* small, 5-partite. *Corolla* tubular-ventricose, slightly gibbous at base, 2-lipped, the upper lip usually the smaller, often a ring of hairs at the base inside below the stamens. *Stamens* 4, didynamous, included; anther-cells oblong, parallel. *Disk* annular. *Ovary* 2-celled, with false septa making it 4-celled when mature; ovules many, 1-seriate in each cell; style filiform; stigma 2-lobed. *Fruit* an oblong or ovoid capsule, loculicidally 2-valved, 4-chambered. *Seeds* many, obliquely oblong or obovate, sub-compressed; cotyledons elliptic-oblong.

Erect herbs; leaves large, thin, the lower ones lobed or pedatisect, sparsely hairy, the lobes often serrate, up to 5 in. long; corollas whitish-pink or purplish, with yellow marks, 1—1.25 in. long; capsule oblong, 1 in. long, dehiscent from above to about halfway down.....1. *indicum*.

Prostrate branching herbs; capsule ovoid, .5 in. or more long:—

Leaves variable, from elliptic or orbicular in outline and deeply pinnatifid to spatulate and coarsely lobed, 1—2 in. long, grey-hispid-pubescent; flowers 1—1.5 in. long; capsule .6 in. long, .3 in. broad, obtuse and apiculate.....2. *laciniatum*.

Leaves orbicular or obovate, crenate, densely white tomentose beneath, .3—5 in. in diam.; flowers .75—1 in. long; capsule .5—7 in. long, obtuse, broad at base, then contracted, apiculate.....3. *prostratum*.

1. *SESAMUM INDICUM*, Linn.; F. B. I. iv. 387; Wt. Ill. t. 163.

All districts, in the plains and lower hills, largely cultivated and often found run wild on road sides and waste land. Gingelly. An erect annual up to 2 ft. high, branching from the base, the seeds obovate, smooth, margined, black or white. The seeds give a valuable oil, used for cooking, for lamps and for many other purposes and largely exported. Vern. *Hind*. Til; *Tel*. Nuvvulu; *Tam*. Yellu cheddi.

2. *SESAMUM LACINIATUM*, Klein; F. B. I. iv. 387; Wt. Ic. t. 1345.

Deccan, in Cuddapah and Kurnool; Carnatic, Kambakam Hill in Chingleput, usually on dry rocky ground.

A stout herb with many prostrate branching stems from a stout central rootstock, the flowers dark purple, the seeds black and deeply reticulate.

3. *SESAMUM PROSTRATUM*, Retz; F. B. I. iv. 387; Wt. Ic. t. 1346.

E. Coast from the Kistna southwards, on sandhills near the

sea; inland at Bangalore (Cleghorn) and near Coimbatore (Fischer) on dry sandy lands; Kambakam Hill in Chingleput (Bourne).

A prostrate herb with long trailing branches from a thick tap-root, the flowers purple, the seeds black and reticulate.

Martynia annua, Linn., the Tiger-claw plant, is a coarse clammy pubescent herb with handsome large rose-coloured blotched flowers, large deltoid-ovate cordate leaves and a curious fruit with 2 sharp anterior hooks. It is common on roadsides, rubbish heaps and waste places. It is a native of Mexico.

Family CXIII. ACANTHACEAE.

Herbs or shrubs, rarely trees. *Leaves* opposite, usually entire, usually lineolate with prominent raphides; stipules 0. *Flowers* hermaphrodite, usually irregular, in cymes racemes or spikes rarely solitary; bracts large or small, sometimes 0; bracteoles usually 2. *Calyx* 5- rarely 4-partite (in *Thunbergia* small, often multifid). *Corolla* 2-lipped or subequally 5-lobed; lobes imbricate or twisted in bud. *Stamens* 4 or 2, inserted on the corolla-tube, sometimes a staminode 5th; anthers 2- or 1-celled, the cells sometimes remote. *Disk* often conspicuous. *Ovary* superior, 2-celled; ovules 1 or more in each cell, in one or two series, anatropous; style simple; stigma usually 2-lobed, the lobes often unequal. *Fruit* a loculicidal capsule, the valves often elastically recurved, the septum splitting. *Seeds* usually hard, attached, except in a few genera, to upcurved supports (*retinacula*), ovoid or compressed, the testa smooth or rugose or clothed with appressed hairs which are often elastic and spread out when wetted; albumen none or rarely scanty; cotyledons usually flattened.

Seeds not supported on retinacula; leaves not lineolate:—

Climbers; flowers usually large; ovules 2 in each cell, collateral:—

Calyx minute, annular or 10–15-toothed.....1. *Thunbergia*.

Calyx 5-lobed.....2. *Meyenia*.

Erect or prostrate plants; flowers usually small; ovules more than 2 in each cell:—

Calyx 4-partite; stamens 2:—

Bracts rigid; peduncle of spike covered with alternate scales...3. *Elytraria*.

Bracts herbaceous; peduncle of spike without scales or 0.....4. *Nelsonia*.

Calyx 5-partite; stamens 4.....5. *Staurogyne*.

Seeds supported on retinacula:—

Retinacula minute, straight; lower leaves often toothed or pinnatifid

6. *Cardanthera*.

Retinacula hooked:—

Corolla without an upper lip, the lower lip large, expanded, 3-lobed:—

Lower filaments with an excurrent process.....7. *Blepharis*.

Lower filaments without an excurrent process.....8. *Acanthus*.

Corolla 2-lipped or with 5 subequal lobes:—

Corolla-lobes twisted to the left in bud:—

Ovules more than 2 in each cell; the capsule normally 6- or more seeded:—

Corolla distinctly 2-lipped:—

Inflorescence spinous; capsule 2–8-seeded.....9. *Asteracantha*.

Inflorescence not spinous; capsule 8- or more seeded...10. *Hygrophila*.

Corolla subequally 5-lobed:—

Capsule clavate with a solid base.....11. *Ruellia*.

- Capsule seed-bearing from the base:—
 Flowers capitate or axillary, subsessile.....12. **Hemigraphis**.
 Flowers in clusters in terminal panicles.....13. **Stenosiphonium**.
 Ovules 2 in each cell; the capsule 4- or fewer-seeded:—
 Placentas separating elastically from the base of the ripe capsule:—
 Bracteoles very large, reticulate; corolla large.....14. **Petalidium**.
 Bracteoles none; corolla small.....15. **Micranthus**.
 Placentas not separating elastically from the base of the ripe capsule:—
 Anthers minutely mucronate at base; stamens 4.....16. **Dyschoriste**.
 Anthers not spurred at the base:—
 Corolla subequally 5-lobed:—
 Stamens 2; corolla-tube long and linear.....17. **Eranthemum**.
 Stamens 4 or 2; corolla-tube usually short and cylindric below, ventricose above.....18. **Strobilanthes**.
 Corolla deeply 2-lipped; stamens 4.....19. **Calacanthus**.
 Corolla-lobes imbricate in bud:—
 Ovules 3—10 in each cell; capsule normally 6- or more-seeded:—
 Capsule compressed at right angles to the septum; seeds ovoid hardly compressed:—
 Flowers in panicles often unilateral racemes, without axillary cladodes.....20. **Andrographis**.
 Flowers clustered in the midst of axillary cladodes.....21. **Haplanthus**.
 Capsule subterete; seed much compressed:—
 Corolla-tube slender, the limb shortly 2-lipped.....22. **Gymnostachyum**.
 Corolla-tube short, the limb deeply 2-lipped.....23. **Diotacanthus**.
 Ovules 2 or rarely 1 in each cell:—
 Corolla-lobes 5, subequal:—
 Anthers 1-celled; 2 inner calyx-lobes smaller than the outer.....24. **Crossandra**.
 Anthers 2-celled:—
 Calyx 4-partite, the anterior lobe of the outer pair more or less bifid; 2 stamens only fully perfect.....25. **Barleria**.
 Calyx 2-partite, the upper lip 3- the lower 2-lobed; 4 stamens, one pair perfect the other imperfect.....26. **Neuracanthus**.
 Calyx 5-partite:—
 Stamens 4; corolla-tube cylindric below, inflated above.....27. **Asystasia**.
 Stamens 2; corolla-tube long and slender, limb spreading.....28. **Pseuderanthemum**.
 Corolla distinctly 2-lipped:—
 Stamens 4, anthers 2-celled; bracts conspicuous, often spinous.....29. **Lepidagathis**.
 Stamens 2:—
 Anthers 1-celled; bracts and bracteoles linear-setaceous.....30. **Monothecium**.
 Anthers 2-celled:—
 Placentas separating elastically from the valves, from the base:—
 Bracts in 1-sided spikes, some of the rows barren.....31. **Rungia**.
 Bracts clustered in the leaf-axils or laxly cymose.....32. **Dicliptera**.
 Placentas not separating elastically from the valves:—
 Anther-cells parallel, subequal; bracts large, imbricate.....33. **Ecbolium**.
 Anther-cells one higher up than the other:—
 Anther-cells with a white basal spur-like appendage.....34. **Justicia**.
 Anther-cells not appendaged spur-like at base:—
 Anther-cells minutely apiculate at base; bracts large.....35. **Adhatoda**.
 Anther-cells muticous; capsule at base stalked:—
 Corolla-tube short, limb small.....36. **Dianthera**.
 Corolla-tube long and slender, the upper lip linear-oblong, the lower broad; bracts and bracteoles small; corolla white.....37. **Rhinacanthus**.

Corolla-tube slender, often twisted; bracts larger than bracteoles in opposite pairs; corolla rose or purple
38. *Peristrophe*.

1. *Thunbergia*, Linn. f.

Climbers, rarely erect. *Leaves* opposite, often cordate hastate or angular palminerved. *Flowers* axillary or in racemes, large or moderate-sized; bracts at the base of the pedicels leaf-like; bracteoles large, enclosing the flower buds. *Calyx* small, annular or 10—16-toothed or obscure. *Corolla* conspicuous, the tube cylindric or ventricose, curved, the limb oblique; lobes 5, twisted to the left in bud. *Stamens* 4, didynamous, inserted near the base of the corolla-tube; anthers 2-celled, the cells parallel, sometimes spurred at the base. *Disk* annular or cushion-like. *Ovary* 2-celled; ovules 2 in each cell; style long; stigma funnel-shaped 2-lobed or entire, or style bifid with capitate stigmas. *Fruit* a capsule, globose below, suddenly narrowed to a barren sword-shaped beak. *Seeds* 2 in each cell, globose, the base hollowed or flattened, the funicle minute or conic, no retinacula.

Flowers axillary, solitary or in pairs on long pedicels; calyx 10—16-toothed:—

Flowers white, leaf-petioles not winged:—

Calyx-teeth linear lanceolate, up to .15 in. long; leaves ovate or oblong, cordate or hastate at base, often angularly lobed, from nearly glabrous to softly tomentose; capsule glabrous or puberulous.....1. *fragrans*.

Calyx-teeth filiform, very villous, up to .25 in. long; leaves ovate or ovate-lanceolate, cordate to hastate with spreading lobes at base, tomentose when young afterwards nearly glabrous; capsule villous.....2. *tomentosa*.

Flowers yellow with purple-black brown or claret-coloured throat; leaf-petioles winged; leaves ovate cordate or hastate, villous; calyx-lobes short, villous; capsule villous, the beak slender.....3. *alata*.

Flowers in racemes, the lower ones often axillary; calyx an entire or slightly crenulate ring:—

Flowers bright yellow or orange, the tube purplish, in long pendent racemes; anthers bearded and with a long slender spur to each cell; leaves lanceolate, acuminate, up to 6 in. long, 2 in. broad, sometimes ovate and up to 3 in. broad, slightly dentate, prominently 3-ribbed and coarsely reticulate, glabrous

4. *mysorensis*.

Flowers pale blue:—

Racemes long, pendent, the bracteoles very prominent, orbicular-cordate, mucronate, about 1 in. in diam. and usually 7-ribbed; anthers glabrous with a long spur to each cell; leaves elliptic-ovate, long-acuminate, up to 5 in. long, 4 in. broad, repand-dentate, 5-ribbed and reticulate.....5. *Wightiana*. Racemes stout, rather dense-flowered, with flowers also in upper axils, solitary or in pairs; bracteoles elliptic-falcate about 1.25 in. long; anthers bearded and spurred; leaves deeply cordate, angular, about 5 in. in diam.....*grandiflora*.

1. *THUNBERGIA FRAGRANS*, Roxb. Cor. Pl. t. 67; F. B. I. iv. 390.

All Districts, but especially on the E. side, up to about 4,000 ft., in the hills, both the species and the varieties *laevis* and *vestita*.

A slender twiner with variable leaves, the end branches having them rather narrow and oblong lanceolate, the flowers not fragrant.

Var. *laevis*, C. B. Clarke. Calyx-tube rather long and stiff, nearly glabrous, the teeth short; leaves thin and reticulate; pedicels often much thickened.

Var. *vestita*, C. B. Clarke. Calyx-tube short, teeth linear, very villous; leaves thick, tawny-villous, often tomentose.

Var. *hispida*, Gamble. Stems and leaves hispid, sometimes nearly strigose; leaves broadly ovate, subcordate, apiculate, repand; bracteoles large; calyx teeth villous.

N. Circars, Mahendragiri in Ganjam (Fischer), Vantabla in Vizagapatam (A. W. Lushington), about 4,000 ft.

2. *THUNBERGIA TOMENTOSA*, Wall.; F. B. I. iv. 391.

W. Gháts, Nilgiri Hills, at 5,000—6,500 ft. (Wight and others), at Coonoor (Meebold); Sirumalai Hills of Madura.

A slender climber with prominent large ovate bracteoles, slender cylindric corolla-tube 1.25 in. long and large rounded lobes, the mature leaves reticulately nerved and with long basal auricles.

3. *THUNBERGIA ALATA*, Bojer Ex. Sims Bot. Mag. t. 2591; F. B. I. iv. 391.

Most Districts, cultivated in gardens and apparently run wild in places in the W. Gháts, native of Tropical Africa.

A slender climber.

4. *THUNBERGIA MYSORENSIS*, T. And.; F. B. I. iv. 393. *Hexacentris mysorensis*, Wt. Ic. t. 871.

W. Gháts, S. Canara and Mysore to Travancore and Tinnevely, up to 3,000 ft.

An extensive glabrous climber with long slender branches, the flowers pendent with long open corolla-lip, the bracteoles ovate-oblong, purplish-green.

5. *THUNBERGIA WIGHTIANA*, T. And.; F. B. I. iv. 393. *Schmidia bicolor*, Wt. Ic. t. 1848.

W. Gháts, Nilgiri Hills, W. side, below Sispara, about 5,000 ft.

A large climber with long pendent branches, the conspicuous bracteoles 2-coloured, half red and half green.

Thunbergia grandiflora, Roxb.; F. B. I. iv. 392; Wt. Ic. t. 872 is a large and beautiful blue-flowered climber, native of Eastern Bengal, frequently grown in gardens. *T. erecta*, T. And., is an erect shrub about 6 ft. high with purple or white flowers, a native of Tropical Africa, often grown in gardens.

2. *Meyenia*, Nees.

A climber. *Leaves* opposite, coriaceous. *Flowers* large, usually solitary, axillary, pedicellate; bracteoles large, ovato-oblong. *Calyx* small, obscurely 5-lobed. *Corolla* funnel-shaped, the throat gradually enlarged; lobes 5 spreading, subequal. *Stamens* 4, didynamous; anthers bearded at the apex, those of the longer pair with unequal cells, one long and narrow, the others spurred at the base, those of the shorter with subequal cells, not spurred, pollen-grains crimped on the margins. *Ovary* 2-celled; ovules 2 in each cell; style slender; stigma 2-lobed, each lobe with a fold behind. *Fruit* a capsule, swollen at the base, with a broad conical beak, 4-seeded. *Seeds* subglobose, the funicle in a small cavity, no retinacula; cotyledons unequal.

MEYENIA HAWTAYNEANA, Nees; Wt. Ic. t. 1487. *Thunbergia Hawtayneana*, Wall. Pl. As. Rar. t. 164; F. B. I. iv. 391.

Deccan and Carnatic, in hilly country, up to 4,000 ft.; W. Gháts, from S. Canara to Nilgiris and Pulneys, on E. slopes chiefly, in dry country.

A small climbing shrub with slender branches, beautiful blue-purple flowers and ovate acute sessile reticulate leaves up to 4.5 in. long, 2 in. broad.

3. *Elytraria*, Vahl.

Herbs, nearly stemless. *Leaves* alternate, crowded, subradical. *Flowers* small, in close rigid, simple or branched, spikes, the scapes closely covered by spirally imbricate bracts, the upper ones larger and flower-bearing; bracteoles small. *Calyx* 4-partite, the segments unequal. *Corolla*-tube linear; limb 2-lipped; lobes 5, the lower longest, imbricate in bud. *Stamens* 2 perfect; anthers elliptic, the cells parallel, sometimes with a minute spur. *Disk* small. *Ovary* oblong, 2-celled; ovules 6—10, superposed, in each cell; style slender; stigma shortly 2-lobed. *Fruit* an oblong acute capsule. *Seeds* small, reticulate, not on retinacula; cotyledons small, round.

ELYTRARIA ACAULIS, Lindau. *E. crenata*, Vahl; F. B. I. iv. 394. *Justicia acaulis*, Linn. f.; Roxb. Cor. Pl. t. 127.

N. Circars, Deccan and Carnatic, in dry Districts, in grassy lands and open forest undergrowth.

A scapigerous herb with small white flowers on long bracteate scapes, the leaves obovate, crenate, obtuse, up to 8 in. long, 2.5 in. broad, the bases surrounded by woolly hairs.

4. *Nelsonia*, R. Br.

Diffuse softly villous herbs. *Leaves* opposite, entire, subequal. *Flowers* small, in dense short spikes with many ovate closely imbricate glandular villous bracts; bracteoles 0. *Calyx* small, 4-partite; lobes unequal, lanceolate, the larger often bifid. *Corolla* small; tube slender; limb 2-lipped; lobes spreading, obtuse. *Stamens* 2, attached above the middle of the corolla-tube; anthers 2-celled, the cells ellipsoid, divergent, mucous or minutely spurred. *Ovary* 2-celled; ovules 8—10 in each cell; style slender; stigma shortly 2-lobed. *Fruit* an oblong, acute capsule, the lower part seed-bearing only. *Seeds* small, subglobose, granular, no retinacula.

NELSONIA CAMPESTRIS, R. Br.; F. B. I. iv. 394.

N. Circars, in undergrowth of deciduous fruit; W. Gháts, Mysore, Malabar and Travancore, at low levels.

A soft trailing herb with purplish flowers, the lower leaves large, oblong, up to 9 in. long, 2 in. broad, long-petioled, the upper ones much smaller and often sessile.

5. *Staurogyne*, Wall.

Herbs or small undershrubs. *Leaves* opposite, rarely alternate, usually petioled with smaller leaves in the axils. *Flowers* small, in terminal or also axillary, simple or compound, lax or dense, spikes or racemes; bracts small or large and leafy; bracteoles 2. small. *Calyx*

deeply 5-partite; segments linear or oblong, subequal or one larger than the others. *Corolla-tube* cylindric or funnel-shaped; limb 2-lipped; lobes 5, short, spreading. *Stamens* 4, didynamous, included, with sometimes a minute staminodial fifth; filaments hairy; anthers with 2 ovoid separate muticous cells. *Disk* small. *Ovary* oblong, 2-celled; ovules numerous; style slender; stigma of 2 narrow lobes, one often again 2-lobed. *Fruit* an oblong capsule with many seeds, seed-bearing throughout. *Seeds* many, globose, smooth or pitted, the hilum hollowed, no retinacula.

Stem erect, the branches not trailing, viscous-pubescent; upper leaves or nearly all alternate, spathulate; bract narrow spathulate, bracteoles 2 linear, small; seeds globose, not pitted.....1. *glauca*.

Stem-branches trailing with short erect stems from the nodes, hispid, not viscous; leaves all opposite, elliptic-oblong or obovate; bract broad, obovate, bracteoles 2 linear-lanceolate; seeds pitted.....2. *zeylanica*.

1. STAUROGYNE GLAUCA, O. Kze. *Ebermaiera glauca*, Nees; F. B. I. iv. 395; Wt. Ic. t. 1488. *E. ligulata*, Bedd. Ic. t. 245.

N. Circars, in Ganjam (Gamble); Deccan, in Kurnool, Nallamalai Hills (Beddome); W. Gháts, Coorg to Travancore, in wet places.

An erect viscous herb with purplish flowers, striped rose or yellow.

2. STAUROGYNE ZEYLANICA, O. Kze. *Ebermaiera zeylanica*, Nees; F. B. I. iv. 397.

Deccan, in Mysore; W. Gháts from S. Canara to Travancore, not common.

A herb of wet places in the forests with trailing branches.

6. *Cardanthera*, Buch.-Ham.

Aromatic, often viscid herbs. *Leaves* opposite, often lineolate, the upper toothed, rarely entire, the lower often pinnatifid, or if submerged, pectinate. *Flowers* in spikes or axillary whorls or 1—3 in the leaf-axils; bracts and bracteoles foliaceous, but often suppressed. *Calyx* 5-partite, the lobes narrow, often unequal. *Corolla-tube* straight; limb 2-lipped, the upper erect, 2-lobed, the lower 3-lobed with a transversely plaited palate. *Stamens* 4, didynamous, anthers of the posterior pair often smaller, cells parallel. *Ovary* narrow, 2-celled; ovules many; style slender; stigma linear, bent. *Fruit* a narrow 2-celled capsule, many-seeded throughout. *Seeds* very many, small, ovoid; retinacula minute, conical, straight.

Flowers in terminal spikes with ovate imbricating bracts; calyx-lobes linear; leaves ovate or oblong or spathulate, up 2·5 in. long, 5 in. broad, entire or crenate.....1. *uliginosa*.

Flowers in axillary whorls:—

Glabrous or nearly so; bracts and calyx-lobes linear-lanceolate, acuminate; leaves oblong, crenate-serrate, up to 2 in. long, 4 in. broad, the lower ones sometimes pinnatifid.....2. *balsamica*.

Crispate-villous; bracts and calyx-lobes spathulate, obtuse; leaves elliptic or obovate, up to 1 in. long, 3 in. broad, crenulate.....3. *verticillata*.

Flowers solitary in opposite axils, rarely in loose spikes; bracts obovate; calyx-lobes linear, often toothed; leaves deeply pinnatifid, up to 4 in. long, 1 in. broad.....4. *pinnatifida*.

1. *CARDANTHERA ULIGINOSA*, Buch.-Ham. ; F. B. I. iv. 403.
N. Circars, Ganjam (Gamble), Godavari in sugar-cane gardens (Bourne); Carnatic, near Madras, in drying rice-fields (Wight); W. Gháts, Anamalái Hills, at 800 ft. (Fischer).
An erect or decumbent branching annual herb with purplish (?) flowers.
2. *CARDANTHERA BALSAMICA*, C. B. Clarke ; F. B. I. iv. 404. *Adenosma balsamea*, Spr. ; Wt. Ic. t. 446.
N. Circars, Deccan and Carnatic, in rice-fields, common.
An erect or decumbent branching annual herb with pink or lilac flowers.
3. *CARDANTHERA VERTICILLATA*, C. B. Clarke ; F. B. I. iv. 404. *Adenosma verticillata*, Nees ; Wt. Ic. t. 1524.
Deccan, in Mysore (Wight); S. Canara (Beddome) in rice-fields.
An erect annual herb with purplish flowers, often rooting below.
4. *CARDANTHERA PINNATIFIDA*, C. B. Clarke ; F. B. I. iv. 405. *Adenosma pinnatifida*, T. And. ; Bedd. Ic. t. 246.
S. Canara (Wight), on river banks (Dalzell).
A slender glandular herb with purple flowers and pinnatifid leaves.

7. *Blepharis*, Juss.

Herbs or undershrubs, often spinous. *Leaves* opposite or 4 in a whorl, sometimes unequal, subentire toothed or spinous. *Flowers* small or moderate-sized, in terminal spikes or on suppressed lateral branches; spikes 1- or few-flowered or capitate or strobilate; bracts in several opposite decussate pairs. *Calyx* 4-partite; lobes unequal, in opposite pairs, the inner smaller. *Corolla*-tube horny, upper lip subobsolete, lower spreading, flat, with 3—5 rounded lobes. *Stamens* 4, didynamous; filaments thick, rigid, the anterior ones produced beyond the insertion of the anthers; anthers 1-celled, the margins thickly bearded, the 2nd cell small or obsolete. *Disk* annular. *Ovary* 2-celled; *ovules* 2 in each cell; style linear; stigma shortly 2-fid. *Capsule* oblong or ovoid, 2- or 4-celled. *Seeds* compressed, orbicular, echinate-papillose, on rigid retinacula.

Leaves in opposite pairs, ovate-lanceolate, acute, entire or spinous-dentate, up to 3 in. long, 1.5 in. broad, with scattered bulbous-based hairs; flowers solitary or in few-flowered terminal spikes; bracts 3 pairs, the middle pair 3-toothed; calyx with the outer lobe spatulate, 1 in. long, the opposite one nearly as long, 2-toothed, the inner pairs smaller, lanceolate; corolla lip 1 in. long; capsule oblong, 4-seeded, the seeds shortly softly echinate, on obtuse retinacula.

1. *asperrima*.
Leaves 4 in a whorl; flowers solitary or 2—3 together; bracts 4 pairs, all with glochidiate spinous teeth; capsule ovoid, 2-seeded, the seeds with long processes, on sharp retinacula:—

Leaves petioled, membranous, up to 5 in. long, 2 in. broad, coarsely toothed; calyx with the outer lobe 1 in. long, oblong, the opposite one similar but smaller, the inner pair smaller still; corolla lip up to 1 in. long.

2. *boerhaaviaefolia*.
Leaves subsessile, thick, obovate-oblong, up to 1 in. long, .3 in. broad, entire, with long scattered hairs; calyx with outer lobe .3 in. long, the opposite one similar, 2-toothed, the inner pair linear; corolla-lip .35 in. long.

3. *molluginifolia*.

1. *BLEPHARIS ASPERRIMA*, Nees; F. B. I. iv. 478; Wt. Ic. t. 1534.
W. Gháts, hills of S. Canara, Mysore and Coorg.
A diffuse, erect or prostrate, herbaceous plant with blue flowers, the bracts and calyx white with green veins.
2. *BLEPHARIS BOERHAAVIAEFOLIA*, Pers.; F. B. I. iv. 478; Wt. Ic. t. 458.
N. Circars, Deccan and Carnatic, in dry Districts, but usually in shady places, up to 4,000 ft.
A prostrate wiry undershrub with pale blue or pink flowers, veined darker and with a yellow spot on the lip, the bracts white veined with green.
3. *BLEPHARIS MOLLUGINIFOLIA*, Pers.; F. B. I. iv. 479.
N. Circars, Deccan and Carnatic, on dry stony lands, or sandy places near the sea.
A prostrate wiry undershrub with small blue flowers, the capsules always closely surrounded by the bracts and calyx-lobes.

8. *Acanthus*, Linn.

Erect or twining herbs or shrubs. *Leaves* pinnatifid, toothed, spinous, rarely entire, the petioles sometimes with spines at their bases. *Flowers* in terminal or pseudo-axillary, strobilate or interrupted spikes; bracts ovate, large, spinescent or small, decussate bracteoles large lanceolate, or 0. *Calyx* 4-partite, the outer 2 lobes the larger. *Corolla*-tube short, horny, upper lip obsolete, lower elongate, obovate, shortly obtusely 3-lobed. *Stamens* 4, didynamous, shorter than the lower lip; filaments stout, curved, not produced beyond the anther; anthers 1-celled, oblong, bearded. *Disk* 0. *Ovary* 2-celled; ovules 2 in each cell; style slender; stigma bifid. *Capsule* ellipsoid, compressed, shining. *Seeds* 4, compressed, orbicular; testa lax and often soft and corrugated.

ACANTHUS ILICIFOLIUS, Linn.; F. B. I. iv. 481. *Dilivaria ilicifolia*, Juss.; Wt. Ic. t. 459.

East and West Coasts, in tidal forests. Sea Holly.

A gregarious shrub reaching 5 feet in height with large blue flowers and spinous holly-like leaves, sharp spines also at the bases of the petioles. Vern. *Hind.* Hargoza; *Tel.* Alisi, Alchi; *Mar.* Marandi.

9. *Asteracantha*, Nees.

A stout herb of wet places; stems numerous, with long sharp thorns at the nodes. *Leaves* narrow, lanceolate, lineolate, in whorls of 6, the two outer leaves of each whorl the larger. *Flowers* in sessile axillary whorls, surrounded by the slightly recurved spines; bracts leafy; bracteoles linear-lanceolate. *Calyx* deeply 4-partite, the upper lobe the largest. *Corolla* 2-lipped, the upper lip 2- the lower 3-lobed with 2 crested folds on the palate; tube cylindric below, enlarged above. *Stamens* 4, didynamous; anthers 2-celled, equal, the cells parallel. *Ovary* 2-celled; ovules 4 in each cell; style pubescent; stigma simple. *Fruit* a linear-oblong capsule. *Seeds* 4—8 on hard retinacula, flat and white-hairy when wet.

ASTERACANTHA LONGIFOLIA, Nees; Wt. Ic. t. 449. *Hygrophila spinosa*, T. And.; F. B. I. iv. 408.

All plains Districts, in wet places, rice-fields, the margins of tanks, etc., common.

A tall hispid herb with pale blue-purple flowers and leaves up to 7 in. long, 1 in. broad. Vern. *Hind.* Talmakhana, Kantakalia; *Tam.* Nirmuli.

10. Hygrophila, R. Br.

Herbs, usually found in wet places. *Leaves* opposite, entire, usually lineolate on the upper surface. *Flowers* bluish-purple, sessile, in terminal heads or axillary whorls; bracts elliptic or lanceolate; bracteoles linear or lanceolate. *Calyx* tubular, 5-fid; lobes linear or lanceolate. *Corolla*-tube dilated above; limb 2-lipped, nearly glabrous, lobes twisted to the left in bud. *Stamens* 4, didynamous, the posterior pair sometimes smaller or rudimentary; filaments glabrous; anthers oblong, the cells equal, divaricate or connate at the base. *Ovary* oblong, the tip pubescent; ovules few or many in each cell; style slender, hairy; stigma simple, linear. *Fruit* a narrowly oblong capsule, seed-bearing from the base. *Seeds* numerous, rarely few, ovoid, compressed, hygroscopically hairy; retinacula hard, curved, acute.

Procumbent herbs with flowers in terminal spikes, the leaves small:—

Spikes 1—5 in. long, glabrous or slightly pubescent; fertile stamens 2 only, the posterior pair reduced to slender curved staminodes; leaves usually glabrous, ovate or oblong, obtuse, 5—15 in. long; seeds 20 or more.....1. *polysperma*.
Spikes under 1 in. long, white-strigose; fertile stamens 4, the anthers of the posterior pair smaller; leaves hairy, elliptic or suborbicular, 2.5—5 in. in diam.; seeds 8—10.....2. *Serpyllum*.

Erect herbs with flowers in axillary whorls, the leaves rather large:—

Bracteoles acute, lanceolate, hispid-ciliate; calyx divided halfway down, the lobes acuminate and white hispid-ciliate; leaves linear or linear-lanceolate

3. *angustifolia*.

Bracteoles obtuse, oblong, strigose; calyx divided one-third way down, the lobes long acuminate, strigose but scarcely hispid-ciliate; leaves obovate or elliptic

4. *quadrivalvis*.

1. *HYGROPHILA POLYSPERMA*, T. And.; F. B. I. iv. 406. *Hemiadelphus polysperma*, Nees; Wt. Ic. t. 1492.

N. Circars, in Kimeddy (Beddome).

A branching and rooting small herb of wet places with pale blue flowers.

2. *HYGROPHILA SERPYLLUM*, T. And.; F. B. I. iv. 406. *Physichilus Serpyllum*, Nees; Wt. Ic. t. 1493.

Deccan, in Mysore (J. Campbell).

A small branching herb of variable forms of leaf, from a woody rootstock.

3. *HYGROPHILA ANGUSTIFOLIA*, R. Br. *H. salicifolia*, Nees; F. B. I. iv. 407; Wt. Ic. t. 1490.

N. Circars, in Godavari; W. Gháts, in all Districts from S. Canara and Mysore southwards, up to 4,000 ft.; in swampy places and along streams.

An erect herb up to 3 ft. in height, usually rooting at the lower nodes, the stems more or less quadrangular, the leaves narrow, the flowers pale purplish-blue.

4. *HYGROPHILA QUADRIVALVIS*, Nees; F. B. I. iv. 408. *H. obovata*, Wt. Ic. t. 1489.

W. Coast and W. Gháts, up to 3,000 ft., in swampy places.

An erect herb, very similar to No. 3, and, like it, rooting at the lower nodes and with subquadrangular stems, the leaves obovate or lanceolate glabrate, the flowers pale purplish-blue.

11. *Ruellia*, Linn. (Sect. *Dipteracanthus*, Nees.)

Herbs or undershrubs. *Leaves* opposite, entire or undulate, lineolate. *Flowers* sessile or subsessile, solitary or in clusters or racemes; bracts 0, bracteoles large, usually exceeding the calyx. *Calyx* 5-partite or 5-fid; lobes subequal, narrow, acute. *Corolla* tubular-ventricose, more or less oblique; lobes subequal, rounded, twisted to the left in bud, spreading in flower. *Stamens* 4, didynamous; filaments glabrous except at base; anthers subequal, 2-celled, cells oblong, muticous, glabrous. *Ovary* 2-celled; ovules 3–10 in each cell; style linear; stigma simple. *Fruit* a clavate capsule, solid at the base, seed-bearing upwards. *Seeds* large thin, discoid, margined, hygroscopically hairy, on strong hooked retinacula.

Stems prostrate or straggling; leaves ovate or elliptic, acute, glabrous or slightly hairy, up to 1·5 in. long, 1 in. broad; calyx-lobes linear-subulate, ciliate; capsules slightly pubescent, seeds 16–20.

Stems erect; leaves ovate, obtuse, grey-pubescent, often undulate, up to 1 in. long, 75 in. broad; calyx-lobes lanceolate, acute, pubescent; capsules glabrous, seeds about 12.

1. *RUELLIA PROSTRATA*, Poir.; F. B. I. iv. 411; Bedd Ic. t. 282.

Most dry Districts, in bushy places, on banks, in gardens, etc.

A diffuse undershrub with solitary pale blue or purple flowers.

2. *RUELLIA PATULA*, Jacq.; F. B. I. iv. 412. *Dipteracanthus patulus*, Nees; Wt., Ic. t. 1505.

Deccan and Carnatic to S. Travancore, on waste lands and by road-sides, common.

A hoary small undershrub with purplish blue flowers, solitary or 2–3 together in the leaf-axils.

R. tuberosa, Linn., is a tropical American plant with deep blue flowers frequently found in Madras Gardens.

12. *Hemigraphis*, Nees.

Herbs, undershrubs or shrubs. *Leaves* opposite, toothed or subentire. *Flowers* sessile, in heads or spikes, terminal or pseudo-axillary on shortened branchlets, rarely paniculate or solitary; bracts large, imbricate, each 1-flowered; bracteoles small and narrow or 0. *Calyx* 5-partite; lobes unequal, lanceolate or linear. *Corolla* tubular-ventricose or funnel-shaped; lobes 5, subequal, twisted to the left in bud. *Stamens* 4, didynamous; included or nearly so; anthers oblong, 2-celled, muticous, the bases acute. *Ovary* 2-celled; ovules 2 in each cell; style linear; stigma 2-lobed, one lobe linear, the other short. *Fruit* a linear or linear-oblong capsule, seed-bearing almost from the base. *Seeds* 6 or more compressed, discoid, hygroscopically hairy.

Corolla tubular-ventricose; longer filaments glabrous in the upper half, hairy below:—

Stiff herbs, hispid with jointed hairs; heads large with 4 large hispid reticulate outer bracts, inner bracts oblong or spatulate, bracteoles linear or 0; calyx-lobes linear, 4 in. long; leaves oblong-spathulate, up to 2 in. long, crenulate; capsule linear-oblong, glabrous, grooved, 5 in. long, seeds 6—8.....1. *dura*.

Soft herbs, villous with white hairs:—

Hairs soft; corolla long-cylindric below, upper part funnel-shaped ventricose; bracts elliptic, bracteoles 0; calyx-lobes linear, obtuse, 3—4 in. long; leaves ovate, crenate, up to 1 in. long; capsule linear-obovoid, glabrous except at rip, 3 in. long, about 12-seeded.....2. *hirta*.

Hairs scabrous; corolla short-cylindric below, upper part campanulate-ventricose; bracts obovate, bracteoles 0, calyx-lobes lanceolate, acuminate, 2 in. long; leaves ovate, crenate, up to 2 in. long; capsule not seen.....3. *venosa*.

Corolla funnel-shaped; longer filaments densely bearded in the upper half:—

Bracts of inner flowers short, ovate lanceolate; heads axillary and terminal, with many soft stiff white hairs; calyx-lobes linear, strigose at first then scarious, one longer than the rest; leaves ovate, acuminate, crenate-serrate, up to 3 in. long, 2 in. broad, petioles usually long; capsule pubescent, tetragonous, 25 in. long, 6-seeded.....4. *latebrosa*.

Bracts of inner flowers long, oblong; heads mostly terminal, glandular-hairy, with white hairs; calyx-lobes linear, one longer than the rest; leaves ovate, subobtusely, crenate, up to 1.5 in. long, 1 in. broad, petioles rather short; capsule hispid-pubescent, 3 in. long, 8—10-seeded.....5. *elegans* var. *crenata*.

1. HEMIGRAPHIS DURA, T. And.; F. B. I. iv. 422.

Deccan, Bellary and Kurnool, East to Guntur and Masulipatam, usually on black cotton soil; S. Canara (Hohenacker).

A procumbent hard very hispid herb with flexuose branches and blue flowers in large heads.

2. HEMIGRAPHIS HIRTA, T. And.; F. B. I. iv. 422.

E. Coast, in Chicacole (Gamble).

A softly pubescent herb with creeping flexuose stems and pale blue flowers in small close terminal heads.

3. HEMIGRAPHIS VENOSA, C. B. Clarke; F. B. I. iv. 423.

Deccan or Carnatic (locality doubtful).

A scabrous pubescent herb with creeping and rooting stems.

4. HEMIGRAPHIS LATEBROSA, Nees; F. B. I. iv. 423; Wt. Ic. t. 1504.

N. Circars, Deccan and Carnatic, in undergrowth of deciduous forest, up to 4,000 ft. in hilly country.

A softly pubescent branching and straggling undershrub, with blue flowers, the tube yellowish white.

Var. *Beddomei*, C. B. Clarke. Leaves smaller, ovate, crenate, nearly glabrous, fruiting sepals white scarious.

Deccan, Ramandrúg in Bellary (Beddome).

Var. *incana*, Gamble. Similar but the leaves very softly white-tomentose and thicker.

Deccan, Horsleykonda in Chittoor (Gamble, Fischer), Wt. K. D. 2272 without locality.

5. HEMIGRAPHIS ELEGANS, Nees; F. B. I. iv. 424.

Var. *crenata*, C. B. Clarke.

S. Canara near Malasamudra (Hohenacker); Ramandrúg in Bellary (Beddome).

A viscid pubescent herb, the flowers blue with a pale tube.

13. *Stenosiphonium*, Nees.

Shrubs, often viscous and with glandular-headed hairs. *Leaves* opposite, usually ovate, the lower one long-petioled with decurrent blade, the upper subsessile, all densely lineolate. *Flowers* sessile, in clusters on elongate interrupted spikes, forming leafy panicles; bract ovate or lanceolate; bracteoles 2, linear, similar to the calyx-lobes. *Calyx* subequally 5-fid, the lobes at first connate, later on separating, linear or lanceolate. *Corolla* narrowly tubular below then suddenly bent obliquely and widened to a ventricose limb; lobes 5, subequal, rounded, twisted to the left in bud. *Stamens* either 2 perfect with sometimes 2 small staminodes, or 4 perfect, the posterior shorter and with smaller anthers than the exsert anterior; anthers oblong, mucous. *Ovary* glabrous; style slender; stigma linear. *Fruit* a clavate capsule, seed-bearing nearly from the base, the retinacula hard. *Seeds* 6—8, compressed, discoid, apparently glabrous when dry, densely white hairy all round when wetted.

Stamens 2; leaves ovate, acuminate, up to 3 in. long, 1.5 in. broad, the lower petioled, the upper often sessile and cordate, nerves 5—7 pairs:—

Spikes with dense but interrupted clusters, prominently viscous-pubescent; corolla .75 in. long with lower half tubular narrow, upper broadly ventricose:—

Bracts ovate or obovate, shortly obtusely acute, .25 in. long, bracteoles linear, equal to the calyx; calyx .3—4 in. long, lobes linear, glandular; leaves crenate-serrate.....1. *diandrum*.

Bracts linear-lanceolate, narrow, .3 in. long, bracteoles similar but narrower; calyx .3 in. long, lobes linear, hair-pointed, very glandular; leaves shallowly dentate.....2. *setosum*.

Spikes slender, interrupted, with small clusters, glandular pubescent; corolla under .5 in. long, lower half very narrow, upper ventricose; bracts lanceolate, acuminate, .25 in. long, bracteoles linear; calyx .25 in. long, the lobes linear glabrate but scabrous; leaves dentate.....3. *parviflorum*.

Stamens 4, the 2 anterior longer than the 2 posterior and with anthers twice the size; leaves ovate, acuminate; corolla about .75 in. long, the tube slender:—

Spikes with close clusters especially the upper ones, white villous and viscous-pubescent; bracts obovate, shorter than the calyx; leaves shortly acuminate, shallowly crenate, up to 3 in. long, 2 in. broad, 5—7-nerved, glabrous, the lower petioled, the upper subsessile and subcordate.....4. *confertum*.

Spikes with distant clusters, nearly glabrous when young, very glandular hairy when old; bracts ovate or obovate, obtusely acute, as long as the calyx, 3-ribbed; leaves caudate-acuminate, strongly crenate-serrate, up to 6 in. long, 2—3 in. broad, 7—8-nerved, glabrous above, sometimes white silky beneath, the lower long-petioled, the upper rounded or subcordate at base.....5. *Russellianum*.

1. *STENOSIPHONIUM DIANDRUM*, Wt. Ic. t. 1502; F. B. I. iv. 426.

Hills of Tinnevely, at Courtallum (Wight).

An erect shrub with apparently pale blue flowers.

2. *STENOSIPHONIUM SETOSUM*, T. And.; F. B. I. iv. 427.

Deccan or Carnatic (G. Thomson).

An erect shrub with pale blue flowers and very long hair-like tips to the calyx-lobes, covered with glandular hairs.

3. *STENOSIPHONIUM PARVIFLORUM*, T. And.; F. B. I. iv. 428.

Deccan or Carnatic (G. Thomson); evergreen forests of Travancore (M. Rama Rao).

An erect shrub with small pale blue flowers.

4. *STENOSIPHONIUM CONFERTUM*, Nees; F. B. I. iv. 427; Wt. Ic. t. 873

(note under t. 1503).

Deccan and Carnatic, hills of Kistna and Kurnool, also Chingleput, westwards to Coimbatore and the E. slopes of the Ghâts down to Tinnevely.

An erect shrub with blue flowers.

5. *STENOSIPHONTUM RUSSELLIANUM*, Nees; F. B. I. iv. 427; Wt. Ic. t. 1503.

N. Circars, in Vizagapatam; Deccan, hills of Mysore, Cuddapah and Chittoor; W. Ghâts, on E. slopes, down to Tinnevely.

An erect shrub with blue flowers and long-acuminate leaves.

Var. *subsericeum*, T. And. The young leaves sometimes smaller, but in old plants rather large, densely white-silky beneath, becoming glabrate when older; flowers deep blue.

Deccan, N. Arcot and Chittoor, to 4,000 ft. on Horsleykonda; Carnatic, Kambakam Hills of Chingleput, southwards to the hills of Tinnevely.

14. *Petalidium*, Nees.

Shrubs or undershrubs. *Leaves* opposite, entire or toothed. *Flowers* shortly pedicelled, in contracted axillary cymes or racemes, often crowded on shortened lateral branchlets, sometimes reduced to a single flower; bracts narrow or 0; bracteoles large, ovate, reticulate, ultimately scarious. *Calyx* 5-partite, lobes unequal, narrowly linear-lanceolate. *Corolla* large, ventricose, straight or curved; lobes 5, subequal, twisted to the left in bud. *Stamens* 4, didynamous, anthers subsimilar, 2-celled; cells parallel, spurred or mucicous at the base. *Ovary* 2-celled; ovules 2 in each cell; style long; stigma with 2 unequal lobes. *Fruit* a clavate capsule, compressed parallel to the septum; placentas separating elastically from the bottom and carrying off the seeds. *Seeds* 2 or 4, discoid, hygroscopically hairy, the retinacula rigid.

PETALIDIUM BARLERIOIDES, Nees; F. B. I. iv. 416.

N. Circars, Ganjam to the Kistna, in deciduous forest, common; W. Coast, in S. Canara.

A handsome shrub reaching 5 ft. in height, the leaves up to 6 in. long, 3 in. broad and long-petioled, the large flowers white or pale blue, 1—1.5 in. long with conspicuous pale reticulate bracteoles.

15. *Micranthus*, Wendl.

Perennial glandular hairy herbs. *Leaves* opposite, membranous, linear-lanceolate, entire or obscurely crenate, ovate, petioled. *Flowers* in dense, terminal, 1-sided spikes; bracts orbicular, imbricate, each pair with usually 3 flowers; bracteoles 0. *Calyx* 5-partite, one lobe ovate, bract-like, the others linear-subulate. *Corolla* small; tube slender, cylindric; lobes slightly unequal, rounded, twisted to left in bud. *Stamens* 4, didynamous; anthers subsimilar, 2-celled; cells parallel, oblong, the base minutely mucronate. *Ovary* 2-celled; ovules 2 in each cell; style long, villous; stigma shortly 2-lobed. *Fruit* a clavate capsule, compressed parallel to the septum, 4-seeded; placentas dehiscing with the seeds elastically from the base. *Seeds* compressed, discoid, white-hairy when wetted.

MICRANTHUS OPPOSITIFOLIUS, Wendl. *Phaylopsis parviflora*, Willd.; F. B. I. iv. 417. *Aetheilema reniforme*, Nees; Wt. Ic. t. 1533.

N. Circars, Ganjam to Godavari, in forest undergrowth, common; W. Gháts, S. Canara to Travancore, at low levels; Shevaroy Hills. A much-branched diffuse viscid herb with small white flowers and reniform or orbicular bracts green at first turning white and scarious with age, the leaves in unequal pairs, up to about 4 in. long and long-petioled.

16. *Dyschoriste*, Nees.

Perennial herbs or undershrubs. *Leaves* opposite, often shortly dentate. *Flowers* in axillary clusters or short cymes; bracts and bracteoles small. *Calyx* tubular; lobes 5, lanceolate or subulate, subequal. *Corolla* tubular, mouth obscurely 2-lipped; lobes 5, obtuse, twisted to left in bud. *Stamens* 4, didynamous; anthers similar, cells parallel, minutely mucronate or spurred at base. *Ovary* glabrous, 2-celled; ovules 2 in each cell; style linear, villous; stigma linear, recurved. *Fruit* an oblong capsule, solid at the base. *Seeds* 4, orbicular, compressed, on strong retinacula, densely white-hairy when wetted; cotyledons cordate.

Stiff woody much-branched undershrub with whitish bark; leaves small obovate, grey-canescant, under .5 in. in diam., subsessile; flowers solitary, the calyx appressed hirsute with short acute lobes, the corolla .75 in. long, tubular below, funnel-shaped above; anthers minutely mucronate at base.....1. *littoralis*. Slender undershrub with green branches from a woody rootstock; flowers in clusters or cymes; leaves green:—

Low plant with prostrate stems often rooting at the nodes; flowers in axillary clusters with long-acuminate nearly glabrous calyx-lobes and small funnel-shaped corolla about .25 in. long; anthers minutely mucronate at base; leaves elliptic or obovate, .75—1.5 in. long.....2. *depressa*.

Erect slender plant, subscaudent, the stems often geniculate; flowers in shortly peduncled axillary cymes with long linear glandular hairy calyx-lobes and broadly tubular corolla, .75 in. long; anthers prominently spurred at base; leaves ovate or lanceolate, acute at both ends, up to 2.5 in. long, 1.5 in. broad, long-petioled.....3. *vagans*.

1. *DYSCHORISTE LITTORALIS*, Nees; Wt. Ic. t. 447. *Calophanes littoralis*, T. And.; F. B. I. iv. 410.

Carnatic, chiefly along the coast on dry sand, also inland westwards to the foot of the Gháts on arid spots.

An undershrub with divaricate branches and rather large blue-purple flowers.

2. *DYSCHORISTE DEPRESSA*, Nees. *Calophanes Nagchana*, C. B. Clarke; F. B. I. iv. 410.

Carnatic, near Madras, westwards to Salem and Coimbatore, in dry places, scarce.

A trailing plant with small violet-pink flowers.

3. *DYSCHORISTE VAGANS*, O. Kze. *Calophanes vagans*, Wt. Ic. t. 1526; F. B. I. iv. 411.

N. Circars, in Godavari; Deccan and Carnatic, in the undergrowth of deciduous forest, up to 3,000 ft. on Kambakam Drug, Ramandrúg and other hills.

A slender diffuse plant, straggling among bushes, with blue flowers.

17. *Eranthemum*, Linn.

Perennial herbs or shrubs. *Leaves* opposite, petioled, entire or obscurely crenulate, very much lineolate. *Flowers* in linear, distant or close, spikes or heads; bracts usually large and prominent; bracteoles smaller, linear-lanceolate. *Calyx* 5-lobed, the lobes narrow, often scarious. *Corolla*-tube long and slender, cylindric, widened at the top, or sometimes at the middle; lobes obovate, twisted to the left in bud, spreading in flower. *Stamens* 2 perfect, with usually 2 others reduced to small staminodes, close to the bases of the filaments; anthers oblong, 2-celled, more or less exserted. *Ovary* 2-celled; ovules 2 in each cell; style long and slender, sparsely hairy; stigma simple or slightly 2-lobed. *Fruit* a clavate capsule with solid base. *Seeds* 4, discoid, on sharp retinacula, hairy when wetted.

Bracts white with green nerves; calyx scarious:—

Bracts elliptic-ovate, cuspidate, nearly glabrous; spikes 1—3 in. long, in close panicles; lower leaves ovate, acuminate at both ends, shortly decurrent, usually up to 4 in. long, 2 in. broad, glabrous, upper many, smaller.....1. *nervosum*. Bracts obovate, obtuse, mucronate or shortly apiculate, glandular strigose; spikes 3—6 in. long, subinterrupted, in elongate panicles, often solitary; lower leaves lanceolate or oblong-lanceolate, acuminate, long tapering and decurrent at base, up to 8 in. long, 3 in. broad, glabrous, upper smaller but fewer.....2. *roseum*.

Bracts green, rarely whitish when old:—

Bracts ovate-lanceolate, long acuminate, prominently many-nerved, white-ciliate on the margins; spikes 1—3 in. long, dense, long-peduncled, forming loose panicles; calyx scarious; lower leaves ovate acuminate, rounded at base and then decurrent, up to 8 in. long, 3.5 in. broad, nearly glabrous, but often scurfy on the nerves beneath, upper subsessile, cordate at base.....3. *purpurascens*. Bracts lanceolate to linear, long acuminate, few-nerved, viscidly glandular-hispid; spikes 2—6 in. long, slender, often interrupted, in large very compound terminal panicles; calyx green, glandular; lower leaves elliptic, acuminate, attenuate at base or sometimes rounded, shortly decurrent, up to 5 in. long, 2 in. broad, glabrous, long-petioled, upper gradually smaller and rounded at base, subsessile.....4. *montanum*.

1. *ERANTHEMUM NERVOSUM*, R. Br. *Daedalacanthus nervosus*, T. And.; F. B. I. iv. 418.

Carnatic, in Tinnevely (Wight), perhaps only in cultivation elsewhere in S. India; frequent in gardens.

A pretty shrub reaching 5 ft. in height with bright blue flowers in short bracteate spikes in large terminal panicles.

2. *ERANTHEMUM ROSEUM*, R. Br. *Daedalacanthus roseus*, T. And.; F. B. I. iv. 419.

W. Coast, in S. Canara (Hohenacker, Wight).

A shrub reaching 6 ft. in height with rose-coloured flowers or "blue fading to purple or red" (Cooke) in long spikes forming elongate terminal panicles.

3. *ERANTHEMUM PURPURASCENS*, Nees. *Daedalacanthus purpurascens*, T. And.; F. B. I. iv. 420. *Justicia pulchella* Roxb. Cor. Pl. t. 177. N. Circars, Ganjam to Godavari, in deciduous forest undergrowth, common; Deccan, Nallamalai Hills of Kurnool, hills

of Cuddapah, Ramandrug in Bellary; Shevaroy Hills of Salem. A shrubby plant up to 4 ft. high with blue flowers in close heads.

4. *ERANTHEMUM MONTANUM*, Roxb.; Wt. Ic. t. 466. *Daedalacanthus montanus*, T. And.; F. B. I. iv. 421. *Justicia montana*, Roxb. Cor. Pl. t. 176.

N. Circars, Ganjam to Godavari, in deciduous forest; W. Ghâts, on E. slopes and hills of Coimbatore to S. Travancore.

A small shrub up to about 3 ft. with very pale blue flowers.

Var. *Wightianum*. Bracts very narrow, linear, up to 6 in. long, the spikes very slender, the leaves broader.

Deccan (Russel; Wall. Cat. 2495a).

Var. *concanense*. Bracts much shorter, almost ovate, under 5 in. long, the spikes slender and much interrupted.

Mysore, at Kempkull, 1,000—2,000 ft. (Meebold).

18. *Strobilanthes*, Blume.

Shrubs, undershrubs or herbs, often gregarious and only flowering after a period of years and then dying off. *Leaves* opposite, often unequal, toothed or subentire, usually lineolate with raphides as are the bracts and other green parts. *Flowers* capitate or in strobilate or interrupted bracteate spikes or paniced, sessile or sometimes pedicelled, usually with 1 floral bract and 2 bracteoles. *Calyx* usually deeply 5-partite, the lobes narrow, subequal or one longer, rarely 2-lipped. *Corolla* usually white blue or purple, rather large, straight or curved, the upper part ventricose, the lower cylindric; lobes 5, rounded or ovate, twisted to the left in bud. *Stamens* 2 or, more usually, 4 didynamous; filaments monadelphous, the bases combined in a sheath more or less adherent at the middle to the corolla, the margins free; anthers oblong, muticous, 2-celled. *Disk* small or as a stalk to the ovary. *Ovary* 2-celled, ovules 2 in each cell; style linear; stigma of one linear branch, the other suppressed or a mere point. *Fruit* a 2- or 4-seeded capsule, the placentas sometimes separating elastically. *Seeds* much compressed, glabrous or hairy on strong curved retinacula.

Stamens 2 fertile, hardly monadelphous, though sometimes connected at base:—

Seeds glabrous even when wetted, without basal areole; cylinder base of corolla long, suddenly widening:—

Flowers in elongate linear subinterrupted viscous spikes; filaments glabrous except at base, no infertile stamens or staminodes; bracts lanceolate, acuminate, up to 5 in. long, viscous-glandular; leaves elliptic, acute or acuminate, crenulate, rugose, up to 6 in. long, 2.5 in. broad, main nerves 6—7 pairs, impressed. 1. *humilis*.

Flowers in ovoid densely capitate heads supported by 4 leaves as outer bracts; filaments hirsute, infertile stamens or staminodes 2; bracts lanceolate, 7 in. long, glabrous, 7-ribbed, bracteoles linear; leaves ovate, acuminate, serrulate, up to 5 in. long, 2 in. broad, main nerves about 8 pairs, slightly impressed. 2. *foliosus*.

Seeds densely hairy when wetted, with a basal areole; cylinder base of corolla short, gradually widening:—

Flowers in dense broad spikes, not interrupted, 1—3 in. long, white-villous, supported by 2 leaves as outer bracts; bracts lanceolate, acuminate, 7 in. long; bracteoles linear, like the calyx 3—5 in. long; filaments pilose; leaves elliptic-lanceolate or obovate, acute, serrate, coriaceous, scabrid above, reticulate and

white-villous in the areoles beneath, up to 3 in. long, 1 in. broad, main nerves 8—10 pairs, strong, parallel.....3. *Kunthianus*.

Flowers in narrow spikes:—

Spikes short, usually under 1 in. long, clustered with the leaves in the upper axils, not interrupted, greyish villous; bracts ovate, bracteoles short, like the calyx .25 in. long; filaments villous near the base; leaves ovate, acute, subentire, coriaceous, puberulous beneath and when young white-tomentose, up to 3 in. long, 1.5 in. broad, main nerves 8—9 pairs, curved and parallel.....4. *canarius*.

Spikes more than 1 in. long, usually axillary or lateral, sometimes panicled:—

Spikes from the first more or less glandular hispid, not woolly, more or less interrupted:—

Spikes 1—2 in. long, often panicled, in the axils of present or fallen leaves along the stems; bracts lanceolate; bracteoles small; calyx .5 in. long with linear lobes; corolla .5 in. long; leaves submembranous, ovate, long cuspidate-acuminate, crenulate, the base rounded and decurrent on the long petiole, up to 7 in. long, 4 in. broad, nerves 10—11 pairs.....5. *jeyporensis*.

Spikes 2—3 in. long, peduncled, single or in usually 3-branched very glandular panicles towards the ends of the branches; bracts lanceolate, acuminate, recurved, bracteoles short; calyx .5 in. long, with linear lobes; corolla .75—1 in. long, glabrous or puberulous without; leaves ovate, cuspidate-acuminate, crenulate, the base acute with long petiole, densely white-silky beneath, up to 6 in. long, 2.5 in. broad, main nerves 8—10 pairs, parallel.....6. *cuspidatus*.

Spikes 2—3 in. long, short-peduncled, very slender, single or in panicles axillary or lateral, often nearly quite glabrous; bracts ovate or lanceolate, acuminate, bracteoles linear, short; calyx .2—3 in. long, the lobes slender; corolla .75 in. long, glabrous without; leaves thin, ovate, long-acuminate, dentate, the base decurrent on a long petiole, nearly or quite glabrous, up to 7 in. long, 4 in. broad, main nerves 7—8 pairs, subparallel.....7. *consanguineus*.

Spikes not glandular at any rate at first but with grey or tawny wool:—

Spikes 3—5 in. long, interrupted, covered with the fulvous or greyish appressed wool when in flower, in fruit becoming also glandular hispid, single or in panicles axillary and terminal; bracts ovate-lanceolate, glabrous within, bracteoles small, calyx-lobes acuminate, all enlarging in fruit; leaves ovate-lanceolate, long cuspidate-acuminate, covered beneath with appressed cinnamomeous or grey wool, up to 6 in. long, 2 in. broad, main nerves 9—10 pairs, parallel.....8. *Lawsoni*.

Spikes 2—3 in. long, not interrupted, covered, like the stems and the undersurface of the leaves, with soft spreading floccose tawny wool, single or in panicles; bracts ovate acute, glabrous within, bracteoles small; calyx-lobes linear, .25 in. long; leaves ovate, acuminate with a twisted point, covered beneath with soft tawny wool, up to 5 in. long, 2.5 in. broad, main nerves 10—13 pairs, parallel, impressed.....9. *gossypinus*.

Stamens 4 fertile, usually monadelphous, the filaments combined below in a sheath more or less adherent to the corolla-tube, but the margins usually free:—

Flowers in capitate heads or short spikes:—

Seeds glabrous:—

Stems tetragonous, grooved, winged or not, the bases of the long petioles of the leaves swollen and often auricled; leaves elliptic-lanceolate or oblanceolate, base decurrent, crenate or subentire, glabrous, up to 8 in. long, 4 in. broad, prominently 7—8-nerved; heads very close, 1—2 in. long, enlarged or glandular in fruit; bracts ovate, cuspidate with recurved tips; cylinder base of corolla as long as the campanulate upper part; filament sheath long, ciliate like the stamens, inner pair shorter.....10. *barbatus*.

Stems hardly tetragonous, not winged, the leaf-petioles not auricled:—

Flowers in heads:—

Heads very hairy, short and dense but often elongating in fruit, supported by 2 or more leaf-like involucre bracts:—

Leaves rugose, usually with bulbous-based hairs, scabrous-hispid, sub-coriaceous:—

Corolla with the cylinder base shorter than the urceolate upper part; filaments and their sheaths glabrous:—

Filaments nearly equal, the 2 inner close and rather higher than the 2 divaricate outer; thick low shrubs with lanceolate acute bracts and acuminate calyx-lobes; leaves up to 2 in. long, 1 in. broad, with 6–8 pairs of main nerves impressed above

11. *Wightianus*.

Filaments unequal, the 2 on each side high up separated by a deep depression, sometimes a sterile fifth; slender shrubs with obovate obtuse crenate bracts and linear obtuse calyx-lobes; leaves up to 3 in. long, 2 in. broad, with about 6–7 pairs of main nerves impressed above.....12. *urceolaris*.

Corolla with the cylinder base long and slender, as long as the much curved ventricose part; filaments long white-hairy at base:—

Heads small, flattened, densely white-hairy; bracts leafy, sub-orbicular, with a broad stalk, crenate, bracteoles linear-spathulate, .5 in. long; leaves ovate, acute at both ends, serrate, up to 4.5 in. long, 3 in. broad, main nerves 7 pairs.....13. *pulneyensis*.

Heads large, densely bristly hirsute:—

Bracts oblong, 1–1.5 in. long, bracteoles very long, setaceous bristly; calyx-lobes lanceolate with scarious margins; leaves ovate, acuminate, crenate, rounded at base, up to 6 in. long, 3 in. broad, with 7–8 pairs of main nerves.....14. *neilgherrensis*.

Bracts leafy, obovate, acute, crenate, very silky, bracteoles linear, very white-silky; calyx-lobes narrowly lanceolate, scarious below, silky above; leaves ovate, acute, narrowed at base, up to 4.5 in. long, 2.5 in. broad, with 5 pairs of impressed main nerves

15. *circarensis*.

Leaves stem and inflorescence softly white- or fulvous-glandular hairy, the peduncles flattened; leaves membranous, ovate or lanceolate, long-acuminate, narrowed at base, up to 5 in. long, 2 in. broad; cylinder base of corolla very short, upper part ventricose; filament sheath long, the 2 inner stamens shorter and rather higher up than the outer

16. *anceps*.

Heads softly rufous-hairy, elongate, clavate, on bracteate often deflexed peduncles, with small involucre bracts; cylinder base of corolla short, upper part funnel-shaped; filament sheath elongate, silky straight, truncate at top, the stamens short; bracts membranous, ovate, .75–1 in. long, bracteoles linear; calyx-lobes linear; leaves ovate, acuminate, rounded at base, crenate, up to 4.5 in. long, 3 in. broad, with 5–6 pairs of main nerves.....17. *Perrottetianus*.

Heads erect, very harshly scabrous, with 2 pairs of leafy involucre bracts, floral bracts lanceolate, 1 in. or more long, bracteoles linear also calyx-lobes; corolla large, cylinder base .6 in. long, upper part 1 in., the lobes large; filament sheath short, the inner stamens much shorter than the outer; leaves ovate, acute, shortly cuneate at base, callous-serrate, up to 7 in. long, 4 in. broad, the main nerves 8–9 pairs

18. *papillosus*.

Flowers in spikes, glabrous except sometimes in fruit, bracts not decurrent:—

Spikes erect, oblong:—

Bracts very conspicuous, spreading, leafy, 1–2.5 in. long, glabrous in flower, glandular-hairy in fruit as are the linear-lanceolate calyx-lobes and the small bracteoles; corolla large, cylinder base .5 in. long, upper ventricose part .75 in.; filament sheath short, truncate, the outer stamens the longer; leaves ovate, acuminate, cuneate at base, serrulate, up to 3 in. long, 2 in. broad, with 7–8 pairs main nerves

19. *Zenkerianus*.

Bracts small, not conspicuous, close, glabrous or glandular-hairy, bracteoles small; calyx-lobes .3 in. long, linear; corolla small, .5 in. long, cylinder base as long as the campanulate upper part; filament

sheath short, truncate, villous; leaves lanceolate, acuminate, narrowed and decurrent at base, serrate, up to 6 in. long, 2 in. broad, main nerves 7 pairs raised on upper surface.....20. *Warreensis*.

Spikes deflexed, oblong or clavate, usually glabrous as are the leaves; seeds doubtful but apparently glabrous:—

Spikes .5—7.5 in. long; corolla small, with exsert stamens:—

Heads usually single, glabrous; bracts lanceolate, subcoriaceous; calyx-lobes lanceolate, acuminate; cylinder base of corolla .25 in. long, slender, the upper part campanulate, spreading; filament sheath short, white-fringed; leaves glabrous, lanceolate, acuminate at both ends, serrate, up to 4.5 in. long, 1.5 in. broad, main nerves 5—6 pairs, raised above.....21. *ciliatus*.

Heads in racemes, white hairy; bracts ovate, soft, hairy, subscarious; calyx-lobes spatulate, ciliate; cylinder base of corolla .2 in. long, upper part campanulate, longer; filament sheath long, white-hairy; leaves ovate or ovate-lanceolate, long-acuminate at both ends, crenate, up to 5 in. long, 2 in. broad, main nerves 6 pairs

22. *Meeboldii*.

Spikes .75—1.5 in. long; corolla large with included stamens, cylinder base .25 in. long, upper part funnel-shaped, .75 in. long; filament sheath .2 in. long, sparsely hairy, the inner stamens shorter; leaves narrowly lanceolate, acuminate at both ends, subentire, glabrous, up to 6 in. long, 1—1.25 in. broad, main nerves 6 pairs, faint

23. *adenophorus*.

Flowers in erect or rarely deflexed spikes with 2 small involucre bracts, floral bracts large, membranous, elliptic, decurrent, prominently nerved in fruit; calyx-lobes lanceolate, .3 in. long, subscarious; corolla with cylinder base short, upper part ventricose; filament sheath elongate, .4 in. long, fringed, truncate, the stamens short; leaves lanceolate, acuminate, membranous, up to 7 in. long, 2.5 in. broad, main nerves 10 pairs ..24. *decurrens*.

Flowers in large oblong deflexed spikes elongating in fruit, with 2 pairs of oblong involucre bracts a little below; floral bracts lanceolate, acuminate, .5 in. long; cylinder base of corolla very short, upper part campanulate with short recurved lobes; filament sheath broad, glabrous, the stamens all equal and long-exsert; leaves thin, ovate, acuminate, broad but suddenly decurrent at base, sparsely pubescent, up to 9 in. long, 4.5 in. broad, main nerves 10—11 pairs.....25. *micranthus*.

Seeds hairy:—

Seeds appressed villous, the hairs not elastic when wetted; capsule 2-seeded:—

Seeds oblong with large areoles; flowers in panicles of deflexed lanceolate 2—3-flowered heads about .75 in. long, with 2 pairs involucre bracts; bracts lanceolate, long-acuminate, ciliate, bracteoles 0 or minute; corolla 1 in. long, cylinder base short; leaves elliptic, long-acuminate at both ends, crenate, up to 7 in. long, 2.5 in. broad, main nerves 6 pairs

26. *tristis*.

Seeds elliptic with small areoles; flowers in heads, single or 1—3 together, many-flowered, up to 1 in. long, very villous, with small involucre bracts; bracts linear-oblong, obtuse, 1 in. long or less, bracteoles smaller, narrow; corolla .75—1 in. long, cylinder base short; leaves lanceolate, long-caudate-acuminate, tawny pubescent beneath, up to 6 in. long, 1.25 in. broad, main nerves 10—12 pairs.....27. *caudatus*.

Seeds glabrous on the faces, the ring margin with elastic hairs when wetted:—

Seeds not areolate; stem and leaves scabrous-hirsute; heads short and close, in trichotomous panicles with a pair of spatulate involucre leaves; bracts oblong, .75 in. long, fulvous-hairy, bracteoles nearly as long, linear; calyx-lobes .6 in. long; corolla with cylinder base .4 in. long, ventricose upper part .6 in.; leaves ovate, acuminate, round and suddenly decurrent at base, rugose, serrate, up to 7 in. long, 5 in. broad, main nerves about 8 pairs, impressed.....28. *heteromallus*.

Seeds areolate; stem and leaves slightly hairy; heads somewhat elongate, solitary or in terminal or axillary cymes with 1 or more small leaves on the peduncles; bracts ovate, viscous, scarious in fruit, bracteoles short, spatulate; corolla with cylinder base .2 in. long, ventricose upper part

.5 in.; leaves elliptic-lanceolate, acuminate, cuneate at base, crenate, membranous, up to 6 in. long, 2 in. broad, main nerves 8—10 pairs

29. *ixiocephalus*.

Seeds elastically hairy when wetted, both on face and margin, except the areole; spikes 1—1.5 in. long in flower, 2—3 in. in fruit, in close panicles bracteate at the nodes; bracts ovate, acute, decurrent on a thick stalk, reddish-glandular-hairy; bracteoles linear, .2—3 in.; corolla with cylinder base .3 in. long, ventricose upper part .5 in., hairy without; leaves variable, elliptic, acuminate, decurrent at base, crenate, membranous, with shining white hairs, up to 6 in. long, 3 in. broad, often smaller, long-petioled, main nerves 7—10 pairs.....30. *asper*.

Flowers in strobilate often cymose spikes or heads, the bracts usually rounded and concave:—

Seeds glabrous (those of *S. Andersonii* not known):—

Flowers on the branches, axillary or lateral, the spikes with small bracts in pairs below, the first floral bracts usually flowerless:—

Bracteoles 0; sheath of filaments long, narrow, very hairy, inner stamens shorter:—

Bracts elliptic-obovate, obtuse, softly long-glandular-hairy, reticulate, narrowed at base; calyx-lobes oblong, obtuse or emarginate, scarious, .3 in. long; corolla .75—1 in. long, cylinder base as long as the urceolate upper part; leaves elliptic-ovate, acuminate, slightly decurrent, serrate, rugose, up to 6 in. long, 3 in. broad, main nerves about 9 pairs

31. *lupulinus*.

Bracts not glandular hairy, elliptic or orbicular, obtuse or emarginate, usually white or pink; calyx subscarious, lobes emarginate:—

Bracts not decurrent on the rachis of the spike; filament sheath elongate:—

Leaves thick, broadly elliptic, rugose and often bullate, scabrous with bulbous-based hairs above, white-strigose beneath, up to 5 in. long, 2.5 in. broad; main nerves 8—10 pairs, much impressed as are the subparallel transverse nervules; corolla .75 in. long, cylinder base very short.....32. *asperrimus*.

Leaves thin, ovate or elliptic, acuminate, with a few scattered bulbous-based hairs above and many soft white hairs on both sides, up to 6 in. long, 3 in. broad, main nerves 6—8 pairs, raised, the transverse nervules inconspicuous; spikes in short, usually trichotomous cymes; corolla .75 in. long, without cylinder base

33. *Heyneanus*.

Upper bracts of each spike decurrent on the rachis; filament sheath shorter and curved; leaves ovate, subacute, obtuse or subcordate at base, softly villous, up to 1.5 in. long, 1 in. broad, main nerves 4—5 pairs, not prominent; spikes subglobose, solitary or few together, the small peduncle bracts obovate, deflexed; corolla about .5 in. long, campanulate, no cylinder base.....34. *campanulatus*.

Bracteoles linear-oblong; sheath of filaments short, glabrous; stamens subequal; bracts suborbicular, glabrous; calyx-lobes linear-oblong, acute; corolla 1.25 in. long, the cylinder base very short; leaves ovate, acuminate, rounded or subcordate at base, crenulate, loosely villous, up to 7 in. long, 4 in. broad, main nerves 7—8 pairs.....35. *Andersonii*.

Flowers from the old wood, often from near the ground, sometimes also terminal; stamens equal, united by pairs in a short sheath at the base:—

Bracts large, blackish-purple, orbicular, entire, glabrous or glandular-pubescent, .75 in. in diam., bracteoles ligulate, 1 in. long, scabrous; corolla somewhat bilabiate, the lobes reflexed, cylinder base very short; leaves ovate, caudate-acuminate, crenulate, up to 10 in. long, 5 in. broad, main nerves about 8 pairs.....36. *luridus*.

Bracts large, orbicular, serrate, softly hairy but later glabrate, 1—2 in. in diam., prominently nerved, bracteoles oblong, .75 in. long, ciliate; corolla subcampanulate with broad lobes; leaves ovate, acuminate, serrulate, sparsely glandular-hairy, up to 9 in. long, 4 in. broad, main nerves 9 pairs.....37. *bolampattianus*.

Seeds hairy when wet, except on the areoles; bracteoles 0:—

Spikes cylindric, axillary and terminal, 1—3 in. long; bracts ovate, acute or cuspidate, softly hairy; corolla 1 in. long, the cylinder base .25 in.; filament sheath straight, outer anthers larger than inner; leaves ovate, acute, subcordate at base, crenate, rugose or bullate, very softly glandular-hairy, up to 1.5 in. long, .75—1 in. broad, main nerves 6—7 pairs.....38. *sessilis*. Spikes subtetragonous, lateral and terminal, 2.5 in. long; bracts ovate, obtuse, reddish, viscous, subscarious, decurrent at base, .75 in. long; calyx-lobes scarious; corolla large; leaves ovate, acuminate, subcordate, crenate, bristly-pubescent, up to 5 in. long, 3 in. broad, main nerves 9 pairs.....39. *Dupeni*.

Flowers in lax spikes, cymose or paniced; bracts in pairs at the nodes of the panicle-branches; no floral bracts:—

Bracts early deciduous, .3 in. long, bracteoles smaller, calyx-lobes .5 in. long, linear-oblong, obtuse, all glandular-hairy; spikes in panicles much interrupted; corolla 1—1.5 in. long, of which cylinder base about one-third; leaves ovate, acute, rounded or cordate at base, serrate, scabrous and glandular, up to 2 in. long, main nerves about 5 pairs.....40. *Newii*.

Bracts persistent:—

Spikes axillary, solitary or in cymes, covered with long soft viscid glandular hairs; bracts linear, acuminate, recurved, .5—1 in. long, bracteoles smaller; calyx-lobes linear, unequal, .3—5 in. long, longer in fruit; corolla 1—1.25 in. long, the cylinder base about one-third; filament sheath elongate, villous as are the outer filaments, the inner ones shorter; leaves lanceolate, long acuminate, decurrent on the petiole and then auricled, nearly entire, up to 12 or even more in. long, 3 in. broad, main nerves 6—10 pairs; seeds 2, very shaggy with white hairs.....41. *integrifolius*.

Spikes in terminal more or less leafy panicles; seeds 4, hairy:—

Leaves oblong lanceolate, sessile or petioled with the blade decurrent and ending in an auricle:—

Spikes rather stout, flexuose, with the internodes .5—1 in. long, nodal bracts large, ovate, acute, .5 in. long, bracteoles spatulate; calyx .5 in. long, the lobes linear; corolla 1 in., curved, cylinder tube hardly any; leaves elliptic or lanceolate, long acuminate, serrate, up to 8 in. long, 1.5 in. or more broad, main nerves 8—10 pairs, very oblique

42. *homotropus*.

Spikes slender, flexuose, puberulous, the internodes .25—5 in. long, nodal bracts small, oblong, usually under .25 in. long, bracteoles linear, short, glandular hairy; calyx .25—35 in. long, the lobes linear, glabrous; corolla 1 in. long, curved, the cylinder tube rather short; leaves lanceolate, long acuminate, the petiole broadly winged and auricled, serrate, up to 12 in. long, 3.5 in. broad, main nerves 8—12 pairs, very oblique, regular.....43. *gracilis*.

Leaves ovate, acute, abruptly rounded at base and then shortly decurrent on the long petiole, crenulate, glandular-pubescent, the blade up to 6.5 in. long, 4 in. broad, main nerves 10—15 pairs, spreading and prominent; spikes in glandular-pubescent panicles, the nodal bracts oblong, about .2 in. long, bracteoles linear, more hairy than the obtuse calyx-lobes; corolla 1.25 in. long, urceolate, very retrorsely hairy within, cylinder base small; filament sheath curved at base, the inner stamens short.....44. *violaceus*.

Leaves not auricled and not decurrent on the long petiole:—

Stout and very viscous glandular-hairy, the leaves elliptic or oblanceolate, acuminate at both ends, glabrous, undulate, crenate, long-petioled, up to 7 in. long, 3 in. broad, main nerves 10 pairs, prominent, curved; panicles large and loose, very sticky, nodal bracts small, linear; pedicels slender, bracteoles minute, .1 in. long; calyx very glandular-villous, the lobes linear .5 in., one longer; corolla large, verrucose, no cylinder base, 1—1.5 in. long; capsule glabrous, apiculate.....45. *amabilis*.

Slender and with only a few long white glandular hairs, the leaves lanceolate, caudate-acuminate, nearly glabrous, undulate, petioled, up to 5 in. long, 1.25 in. broad, main nerves 7—9 pairs, curved; panicles much branched, nodal bracts ovate acute, spreading or reflexed; pedicels slender, bracteoles very minute; calyx subglabrous, the lobes linear .25

in., one longer; corolla funnel-shaped, .75–1 in., cylinder base very short; capsule oblanceolate.....46. *rubicundus*.

1. *STROBILANTHES HUMILIS*, Gamble n. comb. *Endopogon viscosus*, var. *humilis*; Wt. Ic. t. 1498.
W. Ghâts, Anamalai Hills, at 4,300 ft. (Beddome, No. 69 in Herb. Calc.), Courtallum, in Tinnevely (Wight).
A low shrub scarcely a foot high (Wight). Beddome's specimen was collected in 1858, Wight's in 1836.
2. *STROBILANTHES FOLIOSUS*, T. And.; F. B. I. iv. 433. *Endopogon foliosus*, Wt. Ic. t. 1501. *E. capitatus*, Wt. Ic. t. 1499.
W. Ghâts, Nilgiri and Pulney Hills, at 4,000–7,000 ft. in Shola Forest, common; Sholas on Kudrainukh, S. Canara (Beddome); Brumagiri Hills (Fischer).
A large, gregarious shrub with pale blue flowers, the stems glabrous or glandular pilose, both often on the same plant, the hairy ones usually in the fruiting season. The leafy outer bracts are often deciduous, when the long linear bracteoles and calyx-lobes are conspicuous. It is often found in flower and perhaps does not die down at intervals.
3. *STROBILANTHES KUNTHIANUS*, T. And.; F. B. I. iv. 434. *Phlebo-phyllum Kunthianum*, Nees; Wt. Ic. t. 448.
W. Ghâts, Nilgiris, Pulneys and hills of Travancore, above 6,000 ft., on grassy downs, common, especially in Nilgiris on the E. side; Shevaroy Hills and hills of N. Coimbatore.
A gregarious bushy shrub with blue flowers, colouring large tracts when in flower, probably at intervals of about 6 years.
4. *STROBILANTHES CANARICUS*, Bedd. Ic. t. 215; F. B. I. iv. 434.
W. Ghâts, hills of S. Canara at Kudrainukh 6,000 ft. (Beddome).
A stiff shrub reaching 3–4 ft. in height, with white flowers, the corolla .5 in. long, villous without.
5. *STROBILANTHES JEYPORENSIS*, Bedd. Ic. t. 214; F. B. I. iv. 436.
N. Circars, hills of Vizagapatam and Godavari, at 1,500–2,500 ft. in forest undergrowth (Beddome, Gamble, Barber). A large shrub with white flowers. It flowered in 1874, 1885 and 1902.
6. *STROBILANTHES CUSPIDATUS*, T. And.; F. B. I. iv. 435; Bedd. Ic. t. 221. *Endopogon versicolor*, Wt. Ic. t. 1497.
N. Circars, hills of Godavari at 3,000 ft. (Gamble); W. Ghâts, in almost all Districts, but most common in Nilgiris on N. and E. slopes about 4,000–7,000 ft.
A large shrub with appressed white-woolly or somewhat tawny young branches and the undersurface of the leaves, mature more glabrous. The flowers are of a very pale blue and the spikes very glandular hairy. It was collected in flower in 1851, 1870, 1877, 1884. Its period seems to be about 7 years.
7. *STROBILANTHES CONSANGUINEUS*, C. B. Clarke; F. B. I. iv. 435.
W. Ghâts on N. and E. slopes of Nilgiris and Pulneys, at low levels.
A large shrub, with pale blue or white flowers, the spikes glandular villous, the bracts rather short. It was collected

in flower in 1884, 1897, 1909, and its period may be about 12 years.

Var. *Amomum*, C. B. Clarke; Bedd. Ic. t. 216. Spikes more slender, more interrupted, nearly glabrous; leaves more prominently toothed; bracts larger, acuminate.

Carnatic, Kainbakam Hills of Chingleput (Fischer); W. Gháts, Mysore and Coimbatore to the Pulneys.

Var. *hypoleucus*, C. B. Clarke. Spikes as in var. *Amomum* but the leaves more or less covered beneath with appressed white tomentum.

Hills of the Deccan, Ramandrug in Bellary (Beddome).

8. *STROBILANTHES LAWSONI*, Gamble in Kew Bull. 1923, 374.

W. Gháts, below Sispara in W. Nilgiris, at 5,000–6,000 ft. (Lawson, Gamble) in sheltered sholas; Tambracheri Ghát, Wynaad (Barber); hills of Travancore, among rocks (Bourdillon). An erect shrub with pale blue flowers. It was collected in flower in 1883. The capsules and seeds are large and the latter very hairy when wetted.

9. *STROBILANTHES COSSYPINUS*, T. And.; F. B. I. iv. 434; Bedd. Ic. t. 198; Bot. Mag. t. 7790.

W. Gháts, above Sispara in W. Nilgiris, at 7,000 ft., on open dry hillsides; Mysore? (Lobb.).

A handsome erect shrub with pale blue flowers. It flowered in 1867 to 1870 and 1883 and its period is supposed to be 6 or 7 years (Beddome).

10. *STROBILANTHES BARBATUS*, Nees; F. B. I. iv. 437; Bedd. Ic. t. 212. *S. tetrapterus*, Dalz.

W. Gháts, Bababudan Hills (Talbot), W. Nilgiris, Anamalais and hills of Travancore, at low levels and up to 3,000 ft.

A gregarious shrub with white flowers, flowering about every 7th year (Beddome).

11. *STROBILANTHES WIGHTIANUS*, Nees; F. B. I. iv. 438; Wt. Ic. t. 1514.

W. Gháts, Nilgiris above 6,000 ft., usually on grassy downs, common.

A very rough rather low gregarious shrub with pale blue flowers marked with darker veins, the tube brownish. It may be found in flower in any year.

12. *STROBILANTHES URCEOLARIS*, Gamble in Kew Bull. 1923, 374.

W. Gháts, Nilgiris about Ootacamund, 7,000–8,000 ft. (Bourne, Gamble). Pulney Hills, head of the Bodinaikanur Ghát (Beddome), in Shola forest, on grass land. An erect shrub with long internodes in the forest, a very low branching one in open places, the flowers apparently pale blue.

13. *STROBILANTHES PULNEYENSIS*, C. B. Clarke; F. B. I. iv. 438.

W. Gháts, Coorg, Nilgiris, Anamalais, Pulneys and hills of Travancore above 5,000 ft.; hills of N. Coimbatore at 5,000 ft. (Fisher), Shevaroy Hills of Salem (Bourne).

A shrub with blue flowers. It seems to have been found in flower at rather long intervals. It flowered at Cairn Hill, Ootacamund, in 1885.

14. *STROBILANTHES NEILGHERRENSIS*, Bedd. Ic. t. 196; F. B. I. iv. 438.
W. Ghâts, Coorg, Wynnaad, Palghât and Pulney Hills, at 3,000—6,000 ft., in evergreen forests.
A large shrub with subtetragonal stems and white flowers. It was found in flower in 1884 (Gamble), 1910 (Fischer), previously by Beddome without date.
15. *STROBILANTHES CIRCARENSIS*, Gamble in Kew Bull. 1923, 373.
N. Circars, hills of Vizagapatam at 2,000—5,000 ft. (Gamble, A. W. Lushington).
An erect shrub with subtetragonous nearly glabrous stems, rather large capsules and glabrous seeds.
16. *STROBILANTHES ANCEPS*, Nees; F. B. I. iv. 442; Bedd. Ic. t. 204.
Var. *microstachya*, C. B. Clarke. *Ruellia?* *punctata*, Nees; Wt. Ic. t. 1563.
W. Ghâts, hills of S. Canara (Beddome); also Carcoor Ghât in Wynnaad; hills of Tinnevely, about Courtallum (Wight) and Naterikal (Hb. Madr.).
A soft slender undershrub with white flowers and glabrous seeds without areoles.
17. *STROBILANTHES PERROTTETIANUS*, Nees; F. B. I. iv. 439; Wt. Ic. t. 1513.
W. Ghâts, Nilgiris, in Shola woods above 6,000 ft., common: Anamalais (Beddome).
A large shrub soft with reddish-purple hairs, the flowers pale blue pink or lilac, the capsule 2-seeded. It was in flower in 1852, again in 1883—1886, since then in 1908 and 1918, but its period is uncertain, it may be 10 years.
18. *STROBILANTHES PAPILLOUS*, T. And.; F. B. I. iv. 445; Bedd. Ic. t. 201.
W. Ghâts, Shola woods of Nilgiris at 7,000—8,000 ft.
A large shrub with large blue flowers, and angular stems which like the leaves and inflorescence are very scabrous with bulbous-based hairs. The close heads have involucre bracts with leafy tips. The seeds are believed to be glabrous and large, without areoles. It flowered at Sispara and on Doddabetta in 1883.
19. *STROBILANTHES ZENKERIANUS*, T. And.; F. B. I. iv. 439; *Endopogon Strobilanthes*, Wt. Ic. t. 1500.
W. Ghâts, Nilgiris, in Shola woods above 6,000 ft., common; Anamalais, at 6,000 ft. (Beddome); Pulney Hills, (Bourne).
A large handsome shrub, with blue flowers and 4-seeded capsule. It was in flower in 1883—85 and again in 1916, but its period, perhaps rather long, is doubtful.
20. *STROBILANTHES WARRFENSIS*, Dalz.; F. B. I. iv. 439. *S. parviflorus*, Bedd. Ic. t. 197.
S. Canara Ghâts (Beddome, Meebold); Coorg, at 3,000 ft. (*vide* Beddome).
An erect shrub 5—6 ft. high with white flowers in slender cottony spikes, capsule 4-seeded.

21. *STROBILANTHES CILIATUS*, Nees; F. B. I. iv. 439; Bedd. Ic. t. 211.
W. Gháts, S. Canara to Travancore, in evergreen forest up to about 4,000 ft.
A slender shrub reaching 4 ft. in height with white or lilac flowers, said to flower yearly.
22. *STROBILANTHES MEEBOLDII*, Craib in Kew Bull. 1910, 278.
Deccan, Kempkull in Mysore, at 1,000 ft. (Meebold).
A small shrub about 3 ft. high, the heads small somewhat strobilate with soft subscarios bracts, the seeds not known but the ovules glabrous.
23. *STROBILANTHES ADENOPHORUS*, Bedd. Ic. t. 225; F. B. I. iv. 440.
W. Gháts, Anamalai Hills, at 4,000–5,000 ft. (Beddome, Fischer), hills of Tinnevelly (Beddome).
A shrub, reaching 3–4 ft. in height, with apparently pale blue flowers and very narrow leaves, probably flowering yearly.
24. *STROBILANTHES DECURRENS*, Nees; F. B. I. iv. 440. *Goldfussia decurrens*, Wt. Ic. t. 1522.
W. Gháts, Coorg (Beddome), Anamalai Hills at 4,500 ft. (Beddome), hills of Tinnevelly (Wight).
A herbaceous (Wight) plant with quadrangular stems. The large decurrent bracts and the very large seeds sometimes nearly 5 in. in diam. are characteristic.
25. *STROBILANTHES MICRANTHUS*, Wt. Ic. t. 1519; F. B. I. iv. 444.
W. Gháts, Nilgiri and Pulney Hills above 6,000 ft., in Shola woods.
An erect almost herbaceous soft shrub with thick branches, large leaves and very distinct corolla (Clarke suggests "reddish") and stamens. It flowered in 1870 and again in 1885 and 1917; the period may possibly be 15 years.
26. *STROBILANTHES TRISTIS*, T. And.; F. B. I. iv. 441. *Goldfussia tristis*, Wt. Ic. t. 1508.
W. Gháts, W. Nilgiris, Anamalais and hills of Tinnevelly, below 6,000 ft. in evergreen forest.
An erect shrub with pale blue flowers.
27. *STROBILANTHES CAUDATUS*, T. And.; F. B. I. iv. 441; Bedd. Ic. t. 213.
W. Gháts, hills of S. Canara, Coorg, Wynaad and Travancore, up to 6,000 ft., in evergreen forest.
An erect shrub, reaching 4–5 ft. high, the flowers white tinged with orange or red. The bracts in the Malabar and Travancore specimens are longer and more spreading than in those from S. Canara.
28. *STROBILANTHES HETEROMALLUS*, T. And.; F. B. I. iv. 437.
W. Gháts, Nilgiri and Pulney Hills, at about 4,000 ft. and above it.
A large shrub, reaching perhaps to 20 ft. high, with pale blue flowers, very scabrous. It was found in flower in 1884–6 (Lawson and Gamble), 1899 (Prain), 1910 (Meebold) in Nilgiris, in 1898 in Pulneys (Bourne). Its period may perhaps be about 14 years.

29. *STROBILANTHES IXIOCEPHALUS*, Benth.; F. B. I. iv. 444; Bedd. Ic. t. 203. *S. Neesianus*, Wt. Ic. t. 1523.
W. Coast and W. Gháts, in S. Canara (Beddome, Hobenacker).
A small straggling shrub with white flowers and very viscid bracts.
30. *STROBILANTHES ASPER*, Wt. Ic. t. 1518; F. B. I. iv. 452.
W. Gháts, Bababudan Hills of Mysore, W. Nilgiris, Anamalais, hills of Malabar, Cochin and Travancore, at 5,000–8,000 ft., margins of Shola woods.
A soft erect shrub about 4–5 ft. high with purplish-white flowers and a strong scent. Its period is possibly quite a short one and perhaps it may not die down at intervals.
31. *STROBILANTHES LUPULINUS*, Nees; F. B. I. iv. 443.
Hills of Mysore, at Aglatti, 3,500 ft. (Meebold); High Wavy Mountain, Madura, 4,000 ft. (Blatter and Hallberg); hills of Travancore and Tinnevely (Wight, Rama Row).
An erect herbaceous undershrub with very glandular-hairy spikes.
32. *STROBILANTHES ASPERRIMUS*, Nees; F. B. I. iv. 443.
W. Gháts, forests of Mysore, North Coimbatore and Wynaad, at about 3,000–5,000 ft.
A rather stout shrub about 3 ft. high, with apparently pale blue corolla and very rough scabrous glandular branches.
33. *STROBILANTHES HEYNEANUS*, Nees; F. B. I. iv. 443. *S. rugosus*, Wt. Ic. t. 1619.
W. Gháts, in all Districts from S. Canara to Tinnevely, at about 3,000–4,000 ft., in evergreen forests; Bababudan Hills of Mysore.
A small gregarious shrub reaching 3 ft. in height but usually less, with pale blue flowers. It seems to remain perennial and is often found in flower. It is most variable but the varieties are very difficult to separate. Clarke's var. *fusca* has large usually solitary spikes; his var. *viridis* has the cymes more elongate, more prominently bracteate and the spikes smaller, but they run into one another and the difference seems to be really only climatic.
34. *STROBILANTHES CAMPANULATUS*, Wt. Ic. t. 1562. *S. Heyneanus* var. *campanulata*, C. B. Clarke; F. B. I. iv. 444.
W. Gháts, in Coorg (Wight).
A very small herbaceous shrub reaching scarcely 10 in. high with small spikes and leaves.
35. *STROBILANTHES ANDERSONII*, Bedd. Ic. t. 208; F. B. I. iv. 450.
W. Gháts, Anamalai Hills, at 6,000 ft. (Beddome), in moist woods.
A very large shrub up to 20 ft. high (Beddome), with pale blue large flowers in strobilate spikes 2–2.5 in. long, the leaves membranous.
36. *STROBILANTHES LURIDUS*, Wt. Ic. t. 1515–6; F. B. I. iv. 450.
W. Gháts, W. Nilgiris from Naduvatam to Sispara at 4,000–6,000 ft., hills of Travancore at 4,000 ft. (Beddome).
A large straggling gregarious shrub with thick stems and branches, the lurid purple (sometimes white) flowers in brac-

teate spikes up to 10 in. long with peduncles deflexed, the spikes erect. Mr. Clarke says it flowers every year and I think this is the case, but Wight says it seems only to flower once in several years.

Var. *Bourneae*, Gamble. Bracts, bracteoles and calyx very glandular hairy, the prominent nerves on the bracts resembling those of the next species.

Pulney Hills, in Periya Shola (Bourne).

37. STROBILANTHES BOLAMPATTIANUS, Bedd. Ic. t. 200; F. B. I. iv. 451.

W. Gháts, Bolampatti Hills of Coimbatore, at 4,500—7,000 ft., in moist forests.

A large shrub up to 15 ft. high with brown flowers in terminal or lateral spikes up to 6 in. long, sometimes paniced. Beddome says it flowers every year.

38. STROBILANTHES SESSILIS, Nees; F. B. I. iv. 452; Wt. Ic. t. 1511.

W. Gháts, downs of W. Nilgiris at 6,000—8,000 ft.

A small erect plant with stems 1—1½ ft. high from a perennial rootstock. The flowers are a bright blue-purple, and the bracts after flowering sometimes change to pale pink. It probably flowers almost every year or at any rate at short intervals, the rootstock remaining.

Var. *sessiloides*, C. B. Clarke; Wt. Ic. t. 1512. Leaves thicker, very rugose or bullate, with prominent nerves; the spikes longer.

Bababudan Hills of Mysore, at 6,000 ft. (Talbot, etc.). Nilgiris (Wight).

39. STROBILANTHES DUPENI, Bedd.; F. B. I. iv. 453.

W. Gháts, Anamalais, top of Neliampatti Ghát (Beddome).

A very little known shrub with well-marked bracts and blue flowers.

40. STROBILANTHES NEWII, Bedd. ex C. B. Clarke; F. B. I. 464. *S. extensus*, Bedd. Ic. t. 202, not of Nees.

W. Gháts, Manjerabad in W. Mysore (New).

A small shrub with quadrangular stems and deep purple flowers, with much inflated corolla, the leaves prominently serrate.

41. STROBILANTHES INTEGRIFOLIUS, O. Kze. *S. perfoliatus*, T. And.; F. B. I. iv. 458. *Leptacanthus alatus*, Wt. Ic. t. 1527.

W. Gháts, hills of S. Canara and Coorg.

A gregarious much-branched shrub up to about 4 ft. high, very viscid, with blue flowers and seeds very hairy when wetted. In the Bombay forests, it is said to flower at intervals of 7 years (Talbot). It flowered in S. Canara in 1866 (Beddome).

42. STROBILANTHES HOMOTROPUS, Nees; F. B. I. iv. 474. *S. sexennis*, Bedd. Ic. t. 206, not of Nees.

W. Gháts, Nilgiris, in Sholas above 7,000 ft.

A large shrub with white flowers. It was in flower in 1883, but its period is probably a long one, as it has only rarely been collected.

43. STROBILANTHES GRACILIS, Bedd. Ic. t. 207; F. B. I. iv. 474.

W. Gháts, Anamalais, Pulneys and hills of Travancore, at 4,000—6,000 ft.

A very large shrub (Beddome), reaching 15 ft. in height (Bourne), the flowers white tinged with lilac; mauve-blue (Bourne).

44. *STROBILANTHES VIOLACEUS*, Bedd. Ic. t. 205; F. B. I. iv. 474.
W. Gháts, about Bangi Tappal and Sispara in the Nilgiris at 6,000–7,500 ft.
A large shrub with beautiful blue-purple flowers. It flowers rarely, probably at long intervals. It was found by Beddome in 1870 and by Lawson and Gamble in 1883, so the period may be 13 years.
45. *STROBILANTHES AMABILIS*, C. B. Clarke; F. B. I. iv. 476. *Leptacanthus Walkeri*, Wt. Ic. t. 1507, not of Nees.
A large very sticky shrub with jointed stems and pink flowers. Recorded flowering years are: 1838 (Gough), 1846 (Wt.), 1847 (Gardner), 1855 (Cleghorn), 1861 (T. Anderson), 1873 (Beddome), 1883 (Lawson, Gamble), 1911 (Fischer); the period has been supposed to be about 10 years.
46. *STROBILANTHES RUBICUNDUS*, T. And.; F. B. I. iv. 475. *S. paniculatus*, Bedd. Ic. t. 199, not of T. And.
W. Gháts, Wynaad to Travancore and Tinnevely Hills, at 2,000–3,000 ft. (Beddome, Lawson, Bourdillon).
A slender delicate shrub with pink flowers. It flowered in Wynaad in 1816 (Heyne), on the Carcoor Ghát in 1864 and 1888, near Peermerd in 1889, in Tinnevely in 1899.

19. *Calacanthus*, T. And.

An erect shrub. *Leaves* large, entire, lineolate. *Flowers* large, solitary and sessile in the axils of bracts, arranged in long spikes, terminal and from the upper axils; bracteoles 2. *Calyx* 5-partite, the lobes unequal, the upper and 2 lower lanceolate, the 2 lateral linear. *Corolla* purple, deeply 2-lipped; upper lip narrow, shortly bifid, lower shortly 3-lobed, the lobes all contorted in bud. *Stamens* 4, didynamous; filaments connate at base in a transverse membrane; anthers subequal, oblong, 2-celled, ciliate. *Ovary* 2-celled; ovules 2 in each cell; style long, filiform, hairy, stigma linear. *Capsule* obovoid, compressed apiculate, pubescent, 2-seeded. *Seeds* compressed, densely hairy, on curved retinacula.

CALACANTHUS DALZELLIANA, T. And.; F. B. I. iv. 479. *Lepidagathis grandiflora*, Dalz.; Bedd. Ic. t. 226.

Hills of S. Canara up to 3,000 ft. (Beddome).

A leafy gregarious shrub up to 6 ft. high, with large elliptic or lanceolate acuminate leaves up to 8 in. long, 3 in. broad, large purple flowers with transversely plicate lower lip and large capsule, the seeds with brown hairs.

20. *Andrographis*, Wall.

Erect or procumbent herbs or undershrubs, the branches often terragonous. *Leaves* entire, often minutely lineolate. *Flowers* in axillary and terminal, lax, often panicled, racemes, sometimes reduced to 1 flower, often unilateral; bracts small; bracteoles minute or 0. *Calyx* 5-partite, the lobes narrow. *Corolla* small, usually pale but blotched and

spotted with brown and purple, tubular at base, then more or less ventricose, prominently 2-lipped, the upper slightly 2-fid, the lower usually deflexed, 3-lobed and coloured. *Stamens* 2; filaments broad, enlarged at base and sometimes in the middle; anthers 2-celled, usually bearded at base with a tuft of white hair. *Ovary* 2-celled, ovules 2—6 in each cell; style slender; stigma minutely bifid. *Fruit* an oblong or elliptic capsule compressed at right angles to the septum, 4—12-seeded, the retinacula acute or rounded. Seeds hard, deeply rugosely pitted, glabrous.

Capsule linear-oblong:—

Flowers in elongate racemes, sometimes subpaniculate but the flowers distant; stem tetragonous; retinacula acute:—

Anthers bearded at the base, the filaments also more or less hirsute; corolla prominently 2-lipped:—

Corolla under .5 in. long; anthers prominently bearded; leaves glabrous:—

Leaves lanceolate, acute at both ends, up to 3 in. long, .75 in. broad; pedicels up to .25 in. long; calyx-lobes glandular-pubescent...1. *paniculata*.

Leaves linear, under 1 in. long; pedicels .15 in. long; calyx-lobes glabrous, lineolate.....2. *stenophylla*.

Corolla about .75 in. long; anthers bearded but not prominently:—

Stems slender as are the racemes; pedicels up to .2 in. long; leaves lanceolate, acuminate, broadest at the rounded base, nearly glabrous, up to 3 in. long, 1 in. broad; calyx-lobes glandular-pubescent and lineolate

3. *Wightiana*.

Stems stouter as are the racemes; pedicels 0—1 in. long; leaves oblong-lanceolate, acute, cuneate at base, slightly pubescent, up to 3.5 in. long, 1 in. broad; calyx-lobes glandular-pubescent4. *macrobotrys*.

Anthers not bearded at the base, the filaments nearly glabrous; corolla not or only obscurely 2-lipped:—

Corolla about .3 in. long:—

Filaments only slightly broadened below; pedicels very short or 0; leaves ovate, acute, rounded and then decurrent at base, up to 4.5 in. long, 2 in. broad; calyx-lobes glandular-pubescent or nearly glabrous5. *elongata*. Filaments with a prominent rounded protuberance; pedicels usually 0; leaves ovate, acute, attenuate or rounded and then long-decurrent at base, up to 4 in. long, 1.5 in. broad; calyx-lobes glandular-pubescent

6. *ovata*.

Corolla .5—1 in. long; filaments flattened; pedicels .1—1 in. long; leaves below ovate, upper linear-oblong, acute at both ends, glabrous but much lineolate, up to 3.5 in. long, 1 in. broad; calyx-lobes long, glandular-hispid

7. *alata*.

Flowers in racemes, paniculate, the flowers not very distant:—

Racemes short, forming terminal subcapitate panicles; corolla ventricose:—

Leaves elliptic, acute at both ends, glabrous except for scattered jointed hairs, drying black, up to 4 in. long, 2.5 in. broad, raphides minute; calyx-lobes linear, .1—1.5 in. long; capsule up to 1 in. long, glandular-strigose

8. *Neesiana*.

Leaves elliptic-lanceolate, narrowed at both ends, strigose above, softly fulvous-tomentose beneath, up to 2.5 in. long, 1 in. broad, raphides 0; calyx-lobes setaceous, .2—1 in. long; capsule about .75 in. long, glandular-strigose

9. *stellulata*.

Racemes long, forming rather large compound terminal panicles:—

Leaves rather thick, subsessile, ovate or ovate-lanceolate, acute, the base obtuse, glabrous, up to 3 in. long, 1 in. broad, raphides minute; calyx-lobes .1—2 in. long, glandular hairy; corolla ventricose; capsule .8 in. long

10. *lineata*.

Leaves submembranous, petioled, lanceolate, acuminate at both ends, up to 4 in. long, 1—1.5 in. broad, lineolate:—

Corolla with a prominent ventricose protuberance; calyx-lobes .15 in. long, glandular; leaves glabrous above.....11. *producta*.

- Corolla only slightly ventricose; calyx-lobes .3 in. long, scaly and glandular; leaves usually strigose above..... 12. *explicata*.
 Leaves thick, very shortly petioled, ovate or ovate-oblong, rounded at base, strigose above, without raphides, up to 2 in. long, .5—.75 in. broad; corolla slightly ventricose; calyx-lobes .2—.25 in. long, glandular hairy...13. *affinis*.
 Racemes short, in short terminal panicles, sometimes single; low branching undershrubs:—
 Leaves ovate or lanceolate, glabrous, narrowed at both ends, submembranous, up to 2 in. long, .75 in. broad, lineolate; panicles rarely 2 in. long; calyx-lobes .15 in. long; corolla very little ventricose.....14. *viscosula*.
 Leaves small, ovate or orbicular; racemes little branched:—
 Anthers very conspicuously white-bearded; corolla pale, not ventricose; calyx-lobes .15—.2 in., glandular; leaves ovate or orbicular, villous, soft, up to .5 in. in diam., the margins not recurved; capsule .6 in. long, .1 in. broad, glandular.....15. *lobelioides*.
 Anthers not at all bearded; corolla dark, slightly ventricose; calyx-lobes .2—.3 in. long, glandular; leaves ovate or elliptic, rounded or cuneate at base, villous only on the margins which are recurved, hard, up to .6 in. long, .3 in. broad; capsule .6 in. long, .1 in. broad, very glandular hirsute.....16. *Lawsoni*.
 Flowers in slender axillary racemes, sometimes bifid; anthers strongly bearded; retinacula spoon-shaped:—
 Racemes long, up to 4 in., slender, spreading, the pedicels distant; calyx-lobes .2 in. long; leaves ovate or orbicular, shortly petioled, villous, up to .7 in. in diam.; capsule .75 in. long, 8-seeded.....17. *Rothii*.
 Racemes short, few-flowered, the pedicels close:—
 Racemes up to 1.5 in. long; calyx-lobes .3 in. long, glandular-pubescent; leaves elliptic or obovate, subsessile, glabrous, up to 3 in. long, 1.5 in. broad; capsule .6 in. long, 8-seeded.....18. *Beddomei*.
 Racemes scarcely 1 in. long; calyx-lobes .15 in. long, glandular; leaves elliptic or ovate, subsessile, villous, up to 1 in. long, .3 in. broad; capsule .5 in. long, 4-seeded.....19. *glandulosa*.
 Capsule elliptic:—
 Capsule hairy, .35 in. long, .15 in. broad, 4-seeded; seeds large, dark, deeply pitted, retinacula spine-like; anthers slightly bearded; flowers erect, in slender axillary unilateral racemes, which are sometimes 2-branched and as long as or shorter than the leaves; calyx-lobes very slender, .25—.5 in. long; leaves oblong or elliptic, subobtus, up to 3.5 in. long, 1 in. broad.....20. *echioides*.
 Capsule, acute at both ends, glabrous, .4 in. long, .2 in. broad, 8-seeded; seeds small, pale, deeply rugose, retinacula spoon-shaped; anthers much bearded; flowers solitary axillary or in few-flowered racemes in upper axils; calyx-lobes very slender, .25—.4 in. long; leaves orbicular or subreniform, sessile, villous, up to 1 in. in diam.....21. *serpyllifolia*.
1. *ANDROGRAPHIS PANICULATA*, Nees; F. B. I. iv. 501; Wt. Ic. t. 518.
A. subspathulata, C. B. Clarke; F. B. I. iv. 502.
 N. Circars, Deccan and Carnatic to S. Travancore in dry forest undergrowth.
 An erect herb with pink corolla, darker on the lower lip, the capsule usually 12-seeded. A bitter plant, used in medicine.
 2. *ANDROGRAPHIS STENOPHYLLA*, C. B. Clarke; F. B. I. iv. 503.
 Deccan, about Coimbatore (Wight).
 An erect glabrous undershrub with very narrow leaves and stems from a stout rootstock, the corolla pale with dark red stripes.
 3. *ANDROGRAPHIS WIGHTIANA*, Arn. ex Nees; F. B. I. iv. 503; Wt. Ic. t. 1558.
 W. Ghâts, Anamalais and hills of Travancore and Tinnevely, up to 2,500 ft., in evergreen forests.

A very slender nearly glabrous herb, the corolla pink with red-purple lower lip.

4. *ANDROGRAPHIS MACROBOTRYS*, Nees ; F. B. I. iv. 503.
W. Gháts, S. Canara (Hohenacker), Anamalais, Pulneys and hills of Travancore, up to 2,500 ft., in evergreen forests.
A stouter somewhat pubescent herb with pink corolla and dark purple-red blotches on the lower lip, as in the last.
5. *ANDROGRAPHIS ELONGATA*, T. And. ; F. B. I. iv. 502.
W. Gháts, hills of Tinnevely, in evergreen forests, at low levels.
An erect plant with divaricate branches and inflorescence, the corolla apparently pink.
6. *ANDROGRAPHIS OVATA*, Benth. ; F. B. I. iv. 502. *Gymnostachyum ovatum*, T. And. ; Bedd. Ic. t. 250.
N. Circars, Mahendragiri Hill in Ganjam, 4,000 ft. (Gamble, Fischer and Gage), Rampa Hills of Godavari, 2,000—3,000 ft. (Gamble, V. Narayanswami) ; Déccan, Ananthapura in Mysore, 2,000—3,000 ft. (Meebold).
An erect rather tall herb with glandular-pubescent stem and pink corolla.
7. *ANDROGRAPHIS ALATA*, Nees ; F. B. I. iv. 502.
W. Gháts, E. base of slopes in Nilgiris, Coimbatore and Walayar, up to 3,000 ft. in the Gundal Valley (Fischer).
An erect herb reaching 4 ft. in height with very divaricate long branches and white corolla spotted with pink. The upper branchlets have the angles so sharp as to be slightly winged.
8. *ANDROGRAPHIS NEESIANA*, Wt. Ic. t. 1561 ; F. B. I. iv. 504.
W. Gháts, Anamalais, Pulneys and hills of Tinnevely, about 7,000 ft., on grass downs at the margins of sholas and on the banks of streams.
An erect handsome plant about 2—3 ft. high with brownish purple flowers. The heads are usually close, but the racemes elongate later on.
9. *ANDROGRAPHIS STELLULATA*, C. B. Clarke ; F. B. I. iv. 504.
W. Gháts, Nilgiris about 6,000 ft. (Hohenacker, Clarke).
An erect herb with prominent calyx-lobes, the corolla pale pink with purple spots.
10. *ANDROGRAPHIS LINEATA*, Nees ; F. B. I. iv. 504.
Deccan, hills of Cuddapah at 3,000 ft. (Gamble) ; Mysore and N. Coimbatore to the N. slopes of Nilgiris, 3,000—5,500 ft. ; Carnatic, Sirumalai Hills of Madura.
An erect herb, the panicle branches very long and almost spicate in fruit, the corolla pale with purple blotches. Clarke's var. *Lawii*, seems quite a distinct plant but the material is very insufficient.
11. *ANDROGRAPHIS PRODUCTA*, Gamble n. comb. *A. Neesiana* var. *producta*, C. B. Clarke ; F. B. I. iv. 504.
W. Gháts, Malabar, Travancore and Tinnevely, up to 6,000 ft. on W. Nilgiris.
An erect herb.

12. *ANDROGRAPHIS EXPLICATA*, Gamble n. comb. *A. viscosula* var. *explicata*, C. B. Clarke; F. B. I. iv. 504. *A. ceylanica*, Wt. Ic. t. 1560, not of Nees.
W. Gháts, hills of Tinnevely and Travancore, up to 5,000 ft.
An erect herb.
13. *ANDROGRAPHIS AFFINIS*, Nees. *A. Neesiana* var. *affinis*, T. And.; F. B. I. iv. 504.
W. Gháts, Nilgiris and Pulneys at 5,000—7,000 ft.
A slender, many-stemmed undershrub with pale corolla streaked with purple, the inflorescence bracts prominent.
14. *ANDROGRAPHIS VISCOSULA*, Nees; F. B. I. iv. 504; Wt. Ic. t. 1559.
Hills of Tinnevely, about Courtallum (Wight, etc.).
A many-branched woody undershrub reaching scarcely more than 1—1½ ft. high, the corolla apparently lilac with a few dark streaks.
15. *ANDROGRAPHIS LOBELIOIDES*, Wt. Spic. Nilg. t. 181, Ic. t. 1557; F. B. I. iv. 505.
W. Gháts, Nilgiris, on the downs among grass, at 6,000—8,000 ft.
A low much-branched procumbent herb from a woody rootstock, the corolla white streaked with red.
16. *ANDROGRAPHIS LAWSONI*, Gamble in Kew Bull. 1923, 375.
W. Gháts, Kundahs in Nilgiris about Avalanché and Sispara, 7,000—8,000 ft., in grass.
A low undershrub with erect branches and rather long often paniculate racemes, the flowers apparently dark brownish-purple.
17. *ANDROGRAPHIS ROTHII*, C. B. Clarke; F. B. I. iv. 506.
S. Carnatic, plains of Tinnevely (Beddome), lower hills (Fischer).
A straggling undershrub from a woody rootstock, the flowers pale yellow with large purple blotches on the deeply cut lobes of the lower lip.
18. *ANDROGRAPHIS BEDDOMEI*, C. B. Clarke; F. B. I. iv. 506.
Deccan, Nallamalai Hills of Kurnool, 2,000 ft. (Beddome, *vide* F. B. I.); Lankamalai Hills of Cuddapah, up to 1,000 ft. (Fischer).
A many-branched nearly glabrous undershrub, the flowers white with purple spots on the lower lip.
19. *ANDROGRAPHIS GLANDULOSA*, Nees; F. B. I. iv. 505.
Deccan, in Mysore, hills of Cuddapah at 3,000 ft. (Gamble), on rocks.
A straggling small grey-pubescent undershrub, the flowers nearly white with a pale purple tinge on the lower lip.
20. *ANDROGRAPHIS ECHIOIDES*, Nees; F. B. I. iv. 505; Wt. Ic. t. 467.
N. Circars, Deccan and Carnatic, in all dry Districts, common.
An erect herb, villous with whitish hairs, the corolla pink or white with purple blotches on the lower lip.
21. *ANDROGRAPHIS SERPYLLIFOLIA*, Wt. Ic. t. 517; F. B. I. iv. 506.
Deccan and Carnatic, on dry soil, laterite and trap, up to 3,000 ft.
A trailing and rooting procumbent herb from a stout rootstock, the flowers pale with purple blotches on the lower lip.

21. *Haplanthus*, Nees.

Erect herbs. *Leaves* entire, petioled. *Flowers* axillary, in false whorls, surrounded by numerous abortive branchlets reduced to cladodes and ending in spinous points (reduced leaves); bracts and bracteoles small. *Calyx* 5-partite, lobes linear-lanceolate. *Corolla* small, tubular, the tube slightly enlarged above, 2-lipped, the upper lip 2-fid, the lower 3-lobed. *Stamens* 2, shorter than the corolla and inserted below the throat; filaments flattened; anthers 2-celled, connivent; cells ovate, somewhat unequal, mucous, one cell with the connective bearded. *Disk* thick, prominent. *Ovary* 2-celled; ovules 3—8 in each cell; style slender; stigma linear. *Fruit* a linear-oblong capsule, compressed at right angles to the septum, 6—16-seeded. *Seeds* ellipsoid, densely hairy when wetted, retinacula obtuse.

Cladodes stout, quadrangular, .75—1.25 in. long, ending usually in 2 spinous teeth, villous and glandular-hairy; capsule glabrous, .4 in. long; leaves ovate, rounded at base and decurrent on the long petiole, up to 4 in. long, 2 in. broad

1. *verticillaris*.
Cladodes very slender, subquadrangular, .5 in. long, ending in 2 or more teeth, villous with long soft hairs; capsule pubescent, .2 in. long; leaves ovate, rounded at base and decurrent on the long petiole, up to 5 in. long, 2.5 in. broad

2. *neilgherryensis*.

1. *HAPLANTHUS VERTICILLARIS*, Nees; F. B. I. iv. 506.

Dcccan, Ramandrug Hills of Bellary (Beddome).

A herbaceous plant, up to 3 ft. high, the corolla dark lilac with darker lines.

2. *HAPLANTHUS NEILGHERYENSIS*; Wt. Ic. t. 1556. *H. tentaculatus* var. *neilgherrensis*, C. B. Clarke; F. B. I. iv. 507.

W. Ghats, Hills of Mysore, Coorg, S. Canara and Malabar, up to 3,000 ft.

An erect herbaceous plant, with the flowers and cladodes collected in conspicuous soft terminal spikes, the corolla bright blue (Hb. Madr.).

22. *Gymnostachyum*, Nees.

Herbs or undershrubs. *Leaves* cauline or subradical, entire or toothed. *Flowers* subsessile or shortly pedicellate, in axillary cymes or in a terminal spicate or racemose panicle: bracts and bracteoles very small. *Calyx* 5-partite, the lobes linear-lanceolate. *Corolla*-tube slender; limb short, 2-lipped, the lobes subequal, imbricate. *Stamens* 2, included or slightly exserted, filaments slender, usually villous near the base; anthers 2-celled, the cells subequal, oblong or ovate, glabrous or hairy. *Ovary* 2-celled; ovules, numerous in each cell; style slender; stigma subentire. *Fruit* a linear capsule, 16—24-seeded. *Seeds* ovoid, compressed, with soft hairs when wetted.

Inflorescence terminal; leaves chiefly at the base of the stem:—

Corolla large, 1—1.5 in. long, glabrous; leaf-blade ovate, rounded at base and then long-decurrent on the petiole, about 6 in. long; anthers bearded

1. *febrifugum*.

Corolla moderate-sized, .7 in. long, puberulous; leaf-blade ovate, rounded or cordate at base, not decurrent, up to 3 in. long; anthers glabrous

2. *polyanthum*.

Inflorescence axillary, sometimes also terminal:—

Corolla small, up to .7 in. long, pubescent; leaves ovate, acute and slightly decurrent at base, serrulate, 8 in. long or longer; anthers puberulous

Corolla large, 1 in. long, nearly glabrous; leaves broadly ovate, rounded or truncate at base, not usually decurrent, entire, up to 9 in. long; anthers glabrous but the connective rough.....^{3. *canescens*.}
.....^{4. *latifolium*.}

1. *GYMNOSTACHYUM FEBRIFUGUM*, Benth.; F. B. I. iv. 508. *G. alatum*, Wt. Ic. t. 1525.

W. Coast and W. Gháts, S. Canara, Malabar and Travancore.

A small nearly stemless and scapigerous herb with apparently blue flowers, the large usually long-petioled leaves lineolate and undulate crenulate.

2. *GYMNOSTACHYUM POLYANTHUM*, Wt. Ic. t. 1494; F. B. I. iv. 508.

W. Gháts, in Coorg (Jerdon).

A scapigerous herb with a long inflorescence of small opposite cymes in a raceme, the leaves not lineolate though minutely punctate.

3. *GYMNOSTACHYUM CANESCENS*, T. And.; F. B. I. iv. 509. *G. serrulatum*, T. And.; Bedd. Ic. t. 254. *Cryptophragmium canescens*, Nees; Wt. Ic. t. 1495.

W. Gháts, in Malabar, Nilgiris, Anamalais, Travancore and Tinnevely, up to 4,000 ft., in evergreen forests.

A shrubby glandular-hairy plant with small flowers green and yellow (Meebold), the leaves large, lineolate and parallel-nerved, white-pubescent beneath when young.

4. *GYMNOSTACHYUM LATIFOLIUM*, T. And.; F. B. I. iv. 509; Bedd. Ic. t. 253. *Phlogacanthus latifolius*, Wt. Ic. t. 1537.

W. Gháts, in S. Canara, Coorg and Malabar; Bababudan Hills of Mysore, up to 4,000 ft.

A glabrous undershrub up to 3 ft. high with greenish yellow flowers, the very long-petioled leaves not lineolate, parallel-nerved, the lower nerves close together.

Var. *decurrens*, Gamble. Leaves acuminate at base and decurrent on the long petiole, the nerves equally spaced, the calyx-lobes rather shorter.

W. Gháts at Manantoddy, Wynaad (Lawson).

23. *Diotacanthus*, Benth.

Shrubs. Leaves large, membranous, entire or obscurely crenate, not or obscurely lineolate. Flowers in lax cymes, axillary or in terminal trichotomous panicles; bracts small, narrow; bracteoles minute. Calyx 5-partite, the lobes linear-subulate, subequal. Corolla-tube short; limb deeply 2-lipped, ventricose, the upper lip erect, emarginate or shortly 2-lobed, the lower spreading, 3-lobed, the bases shortly auricled. Stamens 2, about as long as the corolla; filaments thickened; anthers oblong, 2-celled, dorsifixed. Disk cupular, thick. Ovary 2-celled; ovules many in each cell; style filiform; stigma small, capitate. Fruit a linear terete capsule, 2-cleft from the base. Seeds many, about 24, compressed, hairy, especially when wet.

Flowers in terminal panicles axillary to upper leaves often 18 in. long; corolla crimson; leaves lanceolate or oblanceolate, acuminate, glabrous, up to 12 in. long, 3.5 in. broad, main nerves about 18 pairs; capsule 1.25 in. long.....1. *grandis*.
 Flowers in axillary cymes about 3 in. long; corolla white; leaves lanceolate, acute or acuminate, nearly glabrous, up to 5 in. long, 2 in. broad, main nerves 7—8 pairs; capsule 1.5 in. long.....2. *albiflorus*.

1. DIOTACANTHUS GRANDIS, Benth.; F. B. I. iv. 515. *Phlogacanthus grandis*, Bedd. Ic. t. 179.
 W. Ghâts, hills of Tinnevely and Travancore, up to 4,000 ft., in dense moist forests.
 A large shrub, reaching 12 ft. in height.
2. DIOTACANTHUS ALBIFLORUS, Benth.; F. B. I. iv. 515. *Phlogacanthus albiflorus*, Bedd. Ic. t. 180.
 W. Ghâts, hills of Tinnevely and Travancore, up to 5,000 ft., in evergreen forest.
 A shrub reaching 7—10 ft. in height.

24. Crossandra, Salisb.

Undershrubs. *Leaves* opposite or whorled, entire or undulate, sometimes slightly toothed. *Flowers* sessile, yellow, in linear-oblong spikes; bracts rather large, imbricate; bracteoles linear or lanceolate. *Calyx* 5-partite to the base, upper 2-lobed, 2-nerved, 2 lower oblong, sometimes connate, 2 inner small, lanceolate. *Corolla*-tube long, linear, incurved; limb unilateral, forming a lip of 5 subequal lobes. *Stamens* 4, didynamous, included in the tube, anthers 1-celled. *Ovary* 2-celled, ovules 2 in each cell; style linear; stigma 2-lobed. *Fruit* an oblong acute capsule. *Seeds* 4, compressed, clothed with appressed fringed scales formed of many connate hairs.

CROSSANDRA UNDULAEFOLIA, Salisb.; F. B. I. iv. 492. *C. axillaris*, Nees; Wt. Ic. t. 460.

Deccan, from the Godavari southwards, west to the Ghâts, in open forest land, commonly planted in gardens and about temples.

A pretty undershrub up to 3 ft. high with orange-yellow flowers and whorled leaves, lanceolate, acute, decurrent at base, up to 6 in. long, 2 in. broad.

25. Barleria, Linn.

Small shrubs or undershrubs, spinous or unarmed. *Leaves* opposite, entire, usually lineolate with cystoliths. *Flowers* showy, solitary or in lax or dense spikes or racemes or helicoid cymes often crowded towards the ends of the branches; bracts 1 fertile, 1 sterile, sometimes reduced to spines; bracteoles 0. *Calyx* deeply 4-partite, the lobes in opposite pairs, the outer pair the larger with the anterior lobe more or less bifid and apparently of 2 connate lobes. *Corolla* large, the tube more or less cylindric at base, funnel-shaped above; lobes 5, subequal, imbricate in bud. *Stamens* 2 long and fertile with oblong 2-celled anthers, 2 small and rudimentary with anthers having sometimes a little pollen, often a fifth quite rudimentary. *Disk* large, cupular, half embracing the ovary. *Ovary* 2-celled; ovules 2 in each cell; style long; stigma bifid or

subentire. *Fruit* an ovoid or oblong capsule 2- or 4-seeded below the middle. *Seeds* compressed, usually clothed with wavy silky appressed hairs, rarely glabrous.

Shrubs or undershrubs with sharp intrapetiolar spines, usually white;

Capsule ovoid, with a solid beak, 2-seeded close to the base:—

Flowers sessile, solitary in lower axils, spicate above; inflorescence bracts foliaceous, oblong, sharply mucronate, floral bracts linear-subulate; leaves elliptic, acuminate, bristly mucronate, glabrous above, often pubescent beneath, up to 7 in. long, 2.5 in. broad, petioled.....1. *Prionitis*.

Flowers subsessile, mostly solitary axillary; inflorescence bracts lanceolate, mucronate, floral bracts 0 or mere bristles; leaves oblong-lanceolate, acute, bristly mucronate, glabrous, pale beneath, up to 2.5 in. long, .5 in. broad, subsessile.....2. *cuspidata*.

Capsule oblong or ellipsoid, the beak not solid, 4-seeded; flowers solitary, no bracts except the spines:—

Outer calyx-lobes oblong or obovate at first, about .3—6 in. long, longer and reticulate in fruit, sometimes emarginate, sometimes with 1—2 spinous teeth, inner small; corolla-tube up to 1 in. long; leaves orbicular or ovate, spinous-mucronate, .5—7.5 in. in diam.....3. *buxifolia*.

Outer calyx-lobes broadly ovate, spinous-toothed, about .75 in. long, softly hairy, scarious, nerved and reticulate in fruit, inner very small; corolla-tube up to 1.5 in. long; leaves elliptic or obovate, obtuse, mucronate, tomentose, .5—1 in. in diam.....4. *mysorensis*.

Outer calyx-lobes ovate, spinous-toothed, about .75 in. long, prominently white-scarious, nerved and reticulate in fruit, inner lanceolate, .4 in. long; leaves oblong or obovate, obtuse or acute, mucronate, .75—1 in. long.....5. *noctiflora*.

Shrubs or undershrubs without spines:—

Flowers in loose many-branched leafy panicles of solitary flowers or somewhat scorpioid cymes; bracts linear; leaves rather small, hairy; capsule 4-seeded, the seeds with appressed hairs:—

Outer calyx-lobes entire, not spinescent-toothed:—

Outer calyx-lobes ovate, obtuse at base, pale and scarious in fruit and prominently reticulate with spreading nerves, .75—1 in. long; corolla-tube very slender, cylindric to near the top, up to 6 in. long, lobes ovate, .5 in. long; leaves ovate-deltoid, acute, closely softly grey-tomentose, up to 1.75 in. long, 1 in. broad.....6. *longiflora*.

Outer calyx-lobes oblong or spatulate, acute, sometimes bifid, pale and scarious in fruit, .5—7.5 in. long:—

Corolla cylindric below, then funnel-shaped, the tube 2 in. long, lobes elliptic-ovate, .75 in. long; leaves elliptic or ovate, acuminate at both ends, yellowish-hirsute with spreading hairs, up to 3 in. long, 1.5 in. broad.....7. *tomentosa*.

Corolla-tube cylindric, scarcely enlarged above, .75—1.5 in. long, lobes orbicular, .3 in. in diam.; leaves ovate, acute, obtuse at base, softly and shortly appressed-tomentose, pale beneath, up to 2 in. long, 1.5 in. broad.....8. *acuminata*.

Outer calyx-lobes ovate-orbicular, reticulate and about 5—7-nerved, with spinescent teeth, .5 in. in diam.; corolla-tube slender, gradually enlarging upwards, about 1 in. long, lobes obovate, about .6 in. long; leaves thin, ovate-acuminate, softly villous, up to 4 in. long, .2 in. broad, long-petioled.....9. *pilosa*.

Flowers large, in a panicle of terminal and axillary helicoid racemes at the ends of the branches; bracts linear; leaves large and glabrescent; capsule 4-seeded, the large seeds appressed-hairy:—

Corolla-tube at first cylindric, soon widening and funnel-shaped, expanding in obovate lobes 3—3.5 in. long in all; outer calyx-lobes oblong, 1 in. long, tawny-pubescent, inner .5 in. long; leaves elliptic, acuminate at both ends, sparsely pubescent, up to 12 in. long, 3 in. broad.....10. *involuta* var. *elata*.

Corolla-tube cylindric, funnel-shaped at top, the lobes suborbicular, emarginate, 2.5—3 in. long in all; outer calyx-lobes lanceolate, one deeply bifid, .5—7 in. long, inner ovate, long-apiculate, .4 in. long; leaves membranous, elliptic, long-acuminate at both ends, pilose, up to 6 in. long, 2 in. broad.....11. *paniculata*.

Flowers medium-sized or large, in axillary and terminal spikes or racemes or sometimes solitary, closer and less leafy upwards:—

Outer calyx-lobes not spinous-ciliate:—

Flowers in tawny-pubescent racemes with very short pedicels; bracts linear-oblong, .4—7 in. long, glandular; outer calyx-lobes elliptic-ovate, nervose, one acuminate, the other shortly bilobed, 1 in. long, inner lanceolate, .3 in. long; corolla long- and narrowly-funnel-shaped, pubescent, veined, 3—3.5 in. long; leaves lanceolate, acuminate at both ends, up to 4 in. long, 2 in. broad.....12. *Lawii*.

Flowers in glandular-hairy tawny spikes; bracts linear, .3 in. long; outer calyx-lobes ovate or ovate-lanceolate, nervose, one slightly bifid at apex, .75—1 in. long; corolla with short cylindric tube, then funnel-shaped, glabrous, lobes obovate, 1.5—2.5 in. long in all; leaves lanceolate or elliptic, acuminate at both ends, glabrous, up to 6 in. long, 3 in. broad.....13. *courtallica*.

Outer calyx-lobes spinous-ciliate, ovate-lanceolate, hairy, mucronate or one sometimes bimucronate, prominently nerved and reticulate, at length white, about .75 in. long, inner smaller; flowers in dense strigosely hairy spikes; bracts linear, usually reflexed, spinous-ciliate, .5 in. long; corolla-tube cylindric then funnel-shaped, lobes ovate, 1—2 in. long in all; leaves variable, ovate or lanceolate or linear-oblong, up to 4 in. long, 1.5 in. broad.....14. *cristata*.

Flowers large, solitary in upper leaf-axils and gradually passing into terminal spikes:—

Seeds densely silky:—

Outer calyx-lobes 1 in. long, prominently ciliate with long hairs, one lanceolate 3-nerved, the other bifid to the middle each side 2-nerved, inner pair linear, .75 in. long; bracts oblong, longer than the calyx; corolla-tube cylindric below funnel-shaped above, lobes obovate emarginate, in all 2 in. long; leaves ovate, sessile, nearly glabrous, up to 2 in. long, 1 in. broad.....15. *Stocksii*.

Outer calyx-lobes 1.5 in. long, nearly glabrous, ovate, .75 in. broad, one sometimes slightly bifid, inner pair linear, .75 in. long; bracts linear-spathulate, shorter than the calyx; corolla tube funnel-shaped, lobes obovate, 2—2.5 in. in all; leaves ovate-lanceolate, acuminate at both ends, glabrous, petioled, up to 5 in. long, 2 in. broad.....16. *montana*.

Seeds glabrous, black; outer calyx-lobes elliptic, acute, 1.25 in. long, .5—75 in. broad, glabrous; bracts subulate, .5 in. long; corolla-tube broadly funnel-shaped, lobes obovate, up to 2.5 in. long in all; leaves ovate or lanceolate, glaucous beneath, up to 7 in. long, 3 in. broad.....17. *Gibsoni*.

Flowers in dense unilateral spikes at the ends of the branchlets; outer calyx-lobes with 9—11 nerves radiating from the base, scarious in fruit; corolla cylindric below, funnel-shaped above, 1.5—2 in. long; capsule 4-seeded:—

Leaves large, ovate, acuminate, long-decurrent on the petiole, glabrate, up to 9 in. long, 4.5 in. broad, main nerves 6—8 pairs; bracts ovate or lanceolate, shorter than the calyx; outer calyx-lobes subequal but one sometimes shortly bifid, ovate, ciliate-denticulate, minutely strigose, 1 in. long, .75 in. broad, inner linear-lanceolate, white-hirsute, .5 in. long.....18. *strigosa*.

Leaves small, ovate, acute, shortly decurrent, strigose beneath, up to 2 in. long, 1 in. broad, main nerves 5 pairs; bracts ovate, 5-ribbed, short; outer calyx-lobes unequal, subspinously denticulate on the margins, outside with long stiff hairs, up to 1.25 in. long, .75 in. broad, inner linear, strigose, .4 in. long.....19. *nitida*.

1. *BARLERIA PRIONITIS*, Linn.; F. B. I. iv. 482; Wt. Ic. t. 452.

All plains Districts, especially the Deccan and Carnatic, chiefly on waste lands and roadsides, sometimes planted in hedges.

A prickly very variable shrub with yellow, or sometimes whitish, flowers. Vern. *Hind. Katsareya*; Tel. *Mulu govinda*.

2. *BARLERIA CUSPIDATA*, Heyne; F. B. I. iv. 483; Wt. Ic. t. 451.

Dry Districts of the Circars, Deccan and Carnatic.

- A very prickly small shrub with white yellow or fawn-coloured flowers and very long straight thorns.
3. *BARLERIA BUXIFOLIA*, Linn.; F. B. I. iv. 483; Wt. Ic. t. 870.
Dry Districts of the Deccan and Carnatic, up to 4,000 ft., chiefly on roadsides and waste lands.
A small very prickly hairy shrub with pink or white flowers, sometimes with long pedicels, but more often nearly sessile. The calyx-lobes enlarge and become scarious in fruit.
 4. *BARLERIA MYSORENSIS*, Roth; F. B. I. iv. 484.
W. Deccan, in Coimbatore, dry places in Malabar and Travancore.
A small prickly shrub with blue or purple flowers, the spines usually long.
 5. *BARLERIA NOCTIFLORA*, Linn. f.; F. B. I. iv. 484.
Deccan and Carnatic, chiefly in somewhat hilly country, on dry waste lands.
A small very prickly shrub, colour of flowers not recorded. The spines are sometimes leafy-margined, showing their bracteate character.
 6. *BARLERIA LONGIFLORA*, Linn. f.; F. B. I. iv. 485.
N. Circars, Deccan and Carnatic, especially on dry rocky hills.
A shrub with very white appearance and very long white flowers, sometimes reaching even 6 inches, usually solitary with a small branchlet opposite.
 7. *BARLERIA TOMENTOSA*, Roth; F. B. I. iv. 485.
Deccan and Carnatic, from the Kistna river southwards, westwards to the drier E. slopes of the W. Gháts up to 4,000 ft.
A low shrub with rose-coloured (?) flowers and obovoid capsules.
 8. *BARLERIA ACUMINATA*, Wt. Ic. t. 450. *B. tomentosa*, Roth. var. *acuminata*, C. B. Clarke; F. B. I. iv. 485.
Deccan, Carnatic and E. side of W. Gháts, up to 5,000 ft.
A low shrub with apparently blue flowers. It is near to the last but is quite distinct in its flowers and indumentum and in the shape of the leaves. The capsules are narrower.
 9. *BARLERIA PILOSA*, Wall.; F. B. I. iv. 486; Bedd. Ic. t. 256.
W. Gháts, hills of Tinnevely up to 1,500 ft.
A small softly pilose undershrub with sky-blue flowers, solitary in the leaf-axils.
 10. *BARLERIA INVOLUCRATA*, Nees; F. B. I. iv. 486; Wt. Ill. t. 164.
Var. *elata*, C. B. Clarke.
W. Gháts, in all Districts, in Shola forests at 3,000—6,000 ft.
A handsome shrub reaching 6 ft. in height, the large flowers blue.
 11. *BARLERIA PANICULATA*, Wall.: *B. tomentosa*, Roth; F. B. I. iv. 485 in part.
Foot of the W. Gháts, in Malabar, Cochin and Travancore, often on rocky river banks (Bourne).
A pretty shrub with rose pink flowers.
 12. *BARLERIA LAWII*, T. And.; F. B. I. iv. 486. *B. Beddomei*, T. And. ex Bedd. Ic. t. 258.

- Bababudan Hills of Mysore (Law *vide* T. And.).
A shrub with long white flowers, prominently veined when dry.
13. *BARLERIA COURTALLICA*, Nees; F. B. I. iv. 489; Wt. Ic. t. 1529.
N. Circars, Rampa Hills of Godavari, at 2,000 ft. (Gamble); W. Gháts, in all Districts, in open places in evergreen forests at low elevations.
A shrub reaching 3—4 ft. high with large blue flowers, yellow in the tube.
14. *BARLERIA CRISTATA*, Linn.; F. B. I. iv. 488; Wt. Ic. t. 453.
All dry plains Districts, in deciduous forest or bushy places, up to about 3,000 ft., sometimes cultivated in gardens.
A nearly herbaceous hairy undershrub with usually blue but sometimes pink or even white flowers, very variable in the leaves and calyx-lobes. The Circar specimens show usually narrow leaves, the W. Coast ones rounded leaves.
15. *BARLERIA STOCKII*, T. And.; F. B. I. iv. 489.
Bababudan Hills of Mysore (Stocks), Kottakota and Gootoor Hills of Anantapur at 2,000 ft. (Gamble).
A small undershrub with pink (?) flowers and a beaked capsule with floccosely woolly seeds.
16. *BARLERIA MONTANA*, Nees; F. B. I. iv. 487.
N. Circars, Godavari valley (Gamble); Kambakam Hill in Chingleput (Cleghorn); hills of Coimbatore and Madura (Fischer); Cochin, at Trichoor (Wight).
A subherbaceous undershrub with blue flowers and an acuminate capsule with wavily silky seeds.
17. *BARLERIA GIBSONI*, Dalz.; F. B. I. iv. 487. *B. montana*, Bedd. Ic. t. 257.
Deccan, Nallamalai Hills of Kurnool, Ramandrúg in Bellary; W. Gháts, Coorg, Malabar, Anamalais (Beddome, etc.).
A glabrous undershrub with pink flowers and black flat glabrous seeds.
18. *BARLERIA STRIGOSA*, Willd.; F. B. I. iv. 489.
N. Circars, in all Forest undergrowth, up to 4,000 ft., common; Deccan, in the forests of the Kurnool Nallamalais and Ramandrúg in Bellary, scarce.
A shrub reaching 4 ft. high with large blue flowers, the seeds very shaggy with long white hairs when wet.
19. *BARLERIA NITIDA*, Nees; F. B. I. iv. 490; Wt. Ic. t. 454.
W. Gháts, hills of Tinnevely.
A small shrub with blue flowers, the seeds with appressed brown hairs.

26. *Neuracanthus*, Nees.

Herbs or undershrubs. *Leaves* opposite, entire. *Flowers* small, spicate, the spikes axillary or terminal, elongate, strobilate or capitate; bracts ovate, imbricate, strongly nerved; bracteoles 0 or minute. *Calyx* 2-partite, the posterior lip 3-, the anterior 2-lobed. *Corolla* tubular below, funnel-shaped above; limb plicate, entire or subbilabiate. *Stamens* 4, didynamous, included, inserted on the middle of the tube;

anterior anthers perfectly 2-celled, posterior with 1 perfect, 1 imperfect cell. *Disk* inconspicuous. *Ovary* 2-celled; ovules usually 2 in each cell; style short; stigma of one oblong lobe. *Fruit* an oblong glabrous capsule, 4-seeded. *Seeds* much compressed, ovoid or suborbicular, silky.

NEURACANTHUS NEESIANUS, C. B. Clarke; F. B. I. iv. 491.

Carnatic, Polur in N. Arcot, on black cotton soil (Wight).

A procumbent hoary-tomentose undershrub with thick leaves about 2 in. long, 1 in. broad, the flowers very small in dense terminal bracteate spikes.

27. *Asystasia*, Blume.

Herbs or undershrubs. *Leaves* opposite, entire or rarely wide-toothed; usually lineolate. *Flowers* in lax or dense, usually 1-sided, simple or compound, spikes or racemes; bracts opposite, usually very small, bracteoles usually minute. *Calyx* deeply 5-partite, the lobes equal, linear or lanceolate. *Corolla-tube* cylindric below, inflated above, ventricose or funnel-shaped; lobes 5 subequal, imbricate in bud. *Stamens* 4, didynamous, perfect; filaments connate at the base in pairs; anthers oblong, the cells parallel, approximate, minutely spurred at the base or mucicous. *Ovary* 2-celled; ovules 2 in each cell; style linear; stigma 2-fid or subcapitate. *Fruit* an elliptic capsule with a contracted solid base, opening widely in a reflexed curve. *Seeds* 4, compressed, orbicular or angular, glabrous, rugose or tuberculate.

Bracts very small; inflorescence secund, of lax racemes of rather distant flowers:—
Branches and leaves grey-puberulous; leaves ovate, acute, usually rounded or subcordate or suddenly narrowed at base, 1—2.5 in. long, 1—1.5 in. broad; calyx-lobes linear, .3 in. long, hirsute; corolla with short cylindric base, the upper part ventricose, much longer, in all 1—1.25 in. long.....1. *gangetica*.
Branches and leaves green, glabrous or slightly pubescent:—

Leaves entire on the margins:—

Leaves elliptic, ovate or narrowly lanceolate, glabrous, the base always narrowed; inflorescence paniculate; corolla white or pale purple, about .75 in. long or less.....2. *chelonoides* var. *quadrangularis*.

Leaves ovate, more or less pubescent, the base in upper branches usually rounded and then decurrent on the petiole, in the lower ones narrowed, the petioles long; inflorescence of solitary or twin terminal racemes; corolla blue, 1—1.5 in. long.....3. *violacea*.

Leaves linear-lanceolate, elongate, often pubescent, the base cuneate; inflorescence of few subpanicled racemes; corolla violet, 1.25—1.5 in. long.....4. *travancorica*.

Leaves crenulate or crispate on the margins, elliptic or ovate, often obtuse at base; inflorescence of usually solitary or twin terminal racemes; corolla white with rose or purple spots.....5. *crispata*.

Bracts and bracteoles large, membranous, oblong-lanceolate; inflorescence erect, of close spikes; corolla small, .5—1 in. long, white; leaves elliptic, acute at both ends, sparsely hairy.....6. *lawiana*.

1. *ASYSTASIA GANGETICA*, T. And. *A. coromandeliana*, Nees; F. B. I. iv. 493.

N. Circars, Deccan and Carnatic, especially near the sea, westwards to the E. slopes of the Ghâts; often cultivated in gardens.

A straggling, often somewhat climbing, perennial herb with smallish leaves and variable flowers, white blue purple or yellow.

2. *ASYSTASIA CHELONOIDES*, Nees; F. B. I. iv. 493.

Var. *quadrangularis*, C. B. Clarke.

W. Gháts, Nilgiris, Anamalais, Pulneys and hills of Tinnevely and Travancore, 2,000—5,000 ft.

A straggling herb with membranous leaves, sparingly strigosely hairy, up to 9 in. long, 3 in. broad.

3. *ASYSTASIA VIOLACEA*, Dalz. ; F. B. I. iv. 494.

W. Gháts, from S. Canara southwards, at low levels.

An erect herb with membranous nearly glabrous leaves.

4. *ASYSTASIA TRAVANCORICA*, Bedd. Ic. t. 178 ; F. B. I. iv. 494.

W. Gháts, Anamalai Hills (Barber) at 3,000 ft. ; hills of Tinnevely and Travancore, especially in the south.

A large shrub with narrow leaves reaching 5 in. in length and at most, though rarely, 1 in. in diam. It grows to 8 ft. in height and is the handsomest species of the genus (Beddome).

5. *ASYSTASIA CRISPATA*, Benth. ; F. B. I. iv. 494. *A. coromandeliana*, Wt. Ic. t. 1506, not of Nees.

W. Gháts, Nilgiri and Pulney Hills, at 4,000—8,000 ft., in Shola forests.

A branching herbaceous undershrub with crispate or sometimes entire leaves variable in size but often up to 5 in. long, 2 in. broad.

6. *ASYSTASIA LAWIANA*, Dalz. ; F. B. I. iv. 496.

W. Deccan, in Mysore and Coorg.

An erect herbaceous plant reaching 3 ft. in height, the leaves up to 3 in. long, 1.5 in. broad, the flowers white.

28. *Pseuderanthemum*, Radlkf.

Glabrous shrubs or undershrubs. *Leaves* opposite, usually lineolate. *Flowers* subsessile, solitary or 1—3 together in the axils of opposite bracts arranged in terminal dense or interrupted simple or branched spikes ; bracteoles small, narrow. *Calyx* 5-fid or 5-partite, the lobes narrow subequal. *Corolla-tube* elongate, cylindric, narrow, rarely widened at the throat ; limb 5-partite, the lobes elliptic, spreading, flat, unequal. *Stamens* 2 fertile with usually 2 upper small clavate staminodes ; anthers 2-celled, the cells oblong, equal, parallel, the connective widened. *Disk* annular or cupular. *Ovary* 2-celled, usually glabrous ; ovules 2 in each cell ; style filiform ; stigma entire or shortly 2-lobed. *Fruit* an oblong capsule with contracted solid stalk, 4-seeded. *Seeds* compressed, orbicular, smooth or rugose, on acute retinacula.

PSEUDERANTHEMUM MALABARICUM, Gamble n. comb. *Eranthemum malabaricum*, C. B. Clarke ; F. B. I. iv. 497.

N. Circars, Palkonda Hills of Vizagapatam (Gamble) ; Deccan, in Mysore and N. Arcot ; W. Gháts from S. Canara to Travancore, in evergreen forest.

An undershrub with white flowers, the leaves ovate or elliptic, acuminate, up to about 5 in. long, 2 in. broad, the capsule valves springing back, the seeds wavy-rugose.

29. *Lepidagathis*, Willd.

Herbs or undershrubs. *Leaves* entire or crenate-serrate, usually lineolate. *Flowers* sessile, usually capitate, sometimes opposite and solitary, the heads terminal or axillary, sometimes densely crowded at the base of the plant; bracts usually conspicuous, bracteoles smaller. *Calyx* deeply 5-lobed, the upper lobe large, the 2 lower opposite it and usually more or less joined, the 2 inner smaller and narrower. *Corolla*-tube cylindric below, above suddenly expanded and 2-lipped, the upper lip erect 2-fid, the lower 3-lobed, usually spotted. *Stamens* 4, didynamous; anthers 2-celled, the cells oblong, opposite or one above the other. *Disk* annular. *Ovary* 2-celled; ovules 2, rarely 1, in each cell; style slender; stigma capitate, shortly 2-lobed or entire. *Fruit* a compressed conoid or oblong capsule. *Seeds* 2 or 4, flattened, hairy.

Capsule 2-seeded, 2-valved from the subsolid tip:—

Spikes aggregated at the base of the stem in globose cushions:—

Bracts and calyx-lobes with dense soft silky hairs, no stiff ones:—

Bracts and calyx-lobes long spinous-mucronate, the bracts broadly ovate; lower calyx-lobes joined to about half-way up; leaves linear-oblong, lineolate, nearly glabrous, up to 1.25 in. long, .25 in. broad.....1. *cristata*.

Bracts and calyx-lobes shortly spinous-mucronate, the bracts broad, obtuse; lower calyx-lobes joined to near the top; leaves oblong or obovate, scabrous on the 5—6 pairs of nerves beneath, ciliate, up to 1.5 in. long, .4 in. broad.....2. *mitis*.

Bracts and calyx-lobes glabrescent but ciliate with long stiff white hairs, all long-spinous mucronate:—

Bracts ovate, suddenly long spinous-acuminate; lower calyx-lobes joined to about 3/4ths the way up; leaves ovate or obovate-oblong, obtuse, up to 1.5 in. long, .6 in. broad, prominently 5—6-nerved, scabrous on the nerves beneath.....3. *subarmata*.

Bracts lanceolate, long spinous-acuminate; lower calyx-lobes joined to half-way up; leaves linear or narrowly oblong, scabrous on the nerves beneath, ciliate on the margins, up to 4 in. long, .4 in. broad, nerves 5—7 pairs, distant.....4. *Hamiltoniana*.

Spikes ovoid, not aggregated at the base of the stem but axillary on the branches:—

Leaves spinous-mucronate, coriaceous:—

One spine usually only at the tip of the small obovate obtuse leaf scarcely .5 in. long; lower calyx-lobes not joined; heads ovoid, .5—75 in. long, the bracts and calyx-lobes all long, spreading or recurved spinous-acuminate.....5. *spinosa*.

Margins of the leaves spinous-serrate as well as the tip:—

Leaves ovate with about 3—4 sharp spinous-mucronate teeth on either side, up to .75 in. long, .5 in. broad; lower calyx-lobes joined to about one-third of the way up; heads broadly ovoid, about .5 in. long, the spreading bracts and the calyx-lobes long spinous-mucronate, very woolly with soft silky hairs inside.....6. *pungens*.

Leaves ovate-oblong with about 3 short spinous teeth on either side, up to .75 in. long, .25 in. broad; lower calyx-lobes joined to about one-half of the way up; heads ovoid, about .5 in. long, the closely adpressed bracts and calyx-lobes shortly spinous-mucronate and with soft hairs.....7. *Barberi*.

Leaves not spinous-mucronate or coriaceous, linear or elliptic, nearly glabrous, up to 1.25 in. long, .1—3 in. broad; lower calyx-lobes joined to about one-fourth the way up; heads ovoid, .5—75 in. long, usually axillary but sometimes also aggregated at the base of the stem, the bracts and calyx-lobes long-acuminate, mucronate, softly and long hairy.....8. *diffusa*.

Capsule 4-seeded, 2-valved, the tip not subsolid:—

Leaves entire or undulate:—

Flowers in elongate villous spikes, the bracts coriaceous, 3-ribbed, sharply

mucronate; lower calyx-lobes joined about $\frac{1}{4}$ way up, 3-ribbed as is the larger upper lobe; corolla-tube short, slightly villous within; anther-cells at rather different levels; leaves of the main stem lanceolate, acuminate, long-decurrent at base, up to 6 in. long, 2 in. broad, upper leaves smaller, sometimes almost linear.....9. *cuspidata*.

Flowers in congested heads, the bracts scarious, mucronate:—

Heads terminal ovoid, the bracts obovate, many-ribbed, lower calyx-lobes joined about $\frac{1}{4}$ way up, 3-ribbed, upper larger, 7-ribbed; corolla-tube short, villous at the middle within; anther-cells equal and opposite, filaments long and slender; leaves ovate, tawny-pubescent beneath, long-petioled, up to 1.5 in. long, 1 in. broad.....10. *scariosa*.

Heads axillary and terminal, often clustered, small or large, the bracts hyaline, 1-nerved, ciliate; lower calyx-lobes very narrow, 1-nerved, joined to half way up, upper slightly larger; corolla-tube long, glabrous; anther-cells small, one a little above the other; filaments short; leaves variable, lanceolate, acuminate, decurrent at base, up to 6 in. long, 2.5 in. broad.....11. *hyalina*.

Leaves crenate-serrate, ovate or lanceolate, acuminate, obtuse and then acuminate-decurrent at base, up to 4.5 in. long, 2 in. broad; flowers in small soft heads in axillary or terminal leafy cymes, the bracts 3-ribbed, ovate; lower calyx-lobes narrow, only joined at base, 1-nerved; corolla-tube rather long; anther-cells separated; capsule very thin, pubescent.....12. *fasciculata*.

1. LEPIDAGATHIS CRISTATA, Willd.; F. B. I. iv. 516; Wt. Ic. t. 455.

N. Circars and Carnatic, in dry places and on rocks.

A stiff undershrub, the branches procumbent from a hard central rootstock, sometimes with occasional globose small heads of flowers in the axils; corolla white, spotted with brown and purple.

2. LEPIDAGATHIS MITIS, Dalz.; F. B. I. iv. 516.

Deccan and Carnatic, in dry sandy places, especially in Nellore, Cuddapah and N. Arcot; plains of S. Canara.

A stiff undershrub, similar to the last but the globose flower heads denser and hardly spinous and more woolly; corolla white or pale pink, spotted with brown and purple.

3. LEPIDAGATHIS SUBARNATA, Gamble n. comb. *L. mitis* var. *subarnata*, C. B. Clarke; F. B. I. iv. 516. *L. rupestris*, Bedd. Ic. t. 229.

Deccan, Cuddapah and Kurnool to Coimbatore, chiefly on black cotton soil.

A stiff undershrub, the globose flower heads smaller.

4. LEPIDAGATHIS HAMILTONIANA, Wall.; F. B. I. iv. 516.

N. Circars, open places in the Ganjam Sál forests (Gamble).

A stiff undershrub, the branches sometimes bearing heads smaller than those at the base of the stem.

5. LEPIDAGATHIS SPINOSA, Wt. ex Nees; F. B. I. iv. 517.

S. Carnatic, plains of Tinnevely.

A stiff prostrate much-branched spinous shrub.

6. LEPIDAGATHIS PUNGENS, Nees; F. B. I. iv. 517.

S. Carnatic, near Palamcottah in Tinnevely.

A stiff much-branched small spinous shrub.

7. LEPIDAGATHIS BARBERI, Gamble n. comb. *L. pungens*, Wt. Ic. t. 456, not of Nees.

W. and S. Carnatic, plains of Coimbatore, Madura and Tinnevely (Barber, Beddome, Fischer).

A much-branched small shrub with white stems, usually erect.

8. *LEPIDAGATHIS DIFFUSA*, C. B. Clarke ; F. B. I. iv. 518.
Deccan and W. Carnatic, Mysore, Bellary and Coimbatore.
A low straggling shrublet from a woody rootstock.
9. *LEPIDAGATHIS CUSPIDATA*, Nees ; F. B. I. iv. 519 ; Bedd. Ic. t. 227.
N. Circars and Deccan, up to about 6,000 ft. in the hills, Coorg.
An erect undershrub, up to about 3 ft. high, the corolla white with purplish spots.
10. *LEPIDAGATHIS SCARIOSA*, Nees ; F. B. I. iv. 520 ; Wt. Ic. t. 457.
Carnatic and E. slopes of the W. Gháts, from Coimbatore southwards.
A small undershrub, the corolla apparently white or pale yellow.
11. *LEPIDAGATHIS HYALINA*, Nees ; F. B. I. iv. 521.
All Districts, by roadsides and in dry forest undergrowth.
A small perennial herb with a woody rootstock, very variable in its leaves and the size of the flower spikes. All the S. Indian specimens seem, as the F. B. I. says, to be var. *mucronata*, C. B. Clarke, except a few which are var. *lophostachyoides*, but it is difficult to separate the vars. The corolla is white with brown spots on the palate.
12. *LEPIDAGATHIS FASCICULATA*, Nees ; F. B. I. iv. 522 ; Bedd. Ic. t. 228.
N. Circars, Ganjam to Godavari, up to 4,000 ft. in the hills ; S. Canara and Mysore, in forest undergrowth and in rocky places.
A herbaceous, soft, villous plant, the corolla white with purple spots.

30. *Monothecium*, Hochst.

Diffuse herbs. *Leaves* entire, lineolate. *Flowers* in small sessile dense, ovate or oblong, unilateral spikes ; bracts and bracteoles linear-setaceous. *Calyx* 5-lobed, lobes equal, linear-setaceous. *Corolla* small, tube short, limb deeply 2-lipped. *Stamens* 2 ; anthers 1-celled, muticous. *Ovary* 2-celled, hairy ; style slender ; stigma minutely bifid. *Fruit* a small oblong capsule, the base solid. *Seeds* 4, compressed, truncate above, testa rugosely furrowed, retinacula obtuse.

MONOTHECIUM ARISTATUM, T. And. ; F. B. I. iv. 524 ; Bedd. Ic. t. 269.
W. Gháts, hills of S. Coimbatore at 1,200 ft. (Fischer), hills of Tinnevely and Travancore, in dry open forests (Beddome, Venkoba Rao).

A branching procumbent often rooting small undershrub, the corolla white with spots on the lower lip, the leaves ovate, pubescent, up to 1.5 in. long.

31. *Rungia*, Nees.

Erect or diffuse herbs or undershrubs. *Leaves* entire, usually and prominently lineolate. *Flowers* in dense terminal or axillary one-sided spikes ; bracts in 2 or 4 rows, 2 of the rows usually without flowers, sometimes similar to but often different from the flowering bracts which usually have scarious hyaline margins ; bracteoles narrower than the flowering bracts. *Calyx* 5-partite, lobes linear-lanceolate. *Corolla* small, blue or white ; limb 2-lipped, the upper lip acute or emarginate, the lower longer 3-lobed. *Stamens* 2 ; anthers 2-celled, the cells usually

superposed, the lower cell often with a white basal appendage. *Ovary* 2-celled; ovules 2 in each cell; style filiform; stigma minutely bifid. *Fruit* an ovoid or oblong capsule, the placentas and retinacula elastically separating from the base after dehiscence. *Seeds* 4, compressed, orbicular, minutely tuberculate or concentrically ridged.

Barren bracts and flowering bracts similar or very nearly so; upper lip of corolla broad, emarginate:—

Spikes narrow and slender, quite 1-sided, on filiform peduncles; bracts lanceolate, mucronate, very narrowly scarious-margined; leaves lanceolate, acute, glabrous or puberulous, up to 1·5 in. long, ·5 in. broad, main nerves 3—5 pairs

1. *linifolia*.

Spikes slender, secund, one-sided, the peduncles short; bracts lanceolate, long-mucronate, narrowly scarious-margined, minutely pubescent; leaves variable, ovate or lanceolate or even linear, acute or acuminate, puberulous, up to 3·5 in. long, 1 in. broad, main nerves about 6 pairs.....2. *apiculata*.

Spikes broad and close with conspicuous broadly scarious-margined nearly orbicular bracts regularly imbricating, ciliate and apiculate, the bracteoles lanceolate, much smaller; leaves linear-oblong to lanceolate, acute or subobtusely, nearly glabrous, up to 3 in. long, ·75 in. broad, main nerves 3—6 pairs.....3. *repens*.

Barren bracts and flowering bracts more or less different; upper lip of corolla acute:—

Both kinds of bracts prominently white-scarious-margined, sub-similar, the barren ones usually narrower:—

Spikes elongate, often 2—3 in. long, in panicles; leaves large and thin, lanceolate, acuminate at both ends, up to 7 in. long, 2 in. broad, main nerves 8—12 pairs.....4. *Wightiana*.

Spikes short, rarely 1 in. long, in small clusters; leaves rather small and thick, ovate-lanceolate, acuminate, rounded at base, up to 3 in. long, 1 in. broad, main nerves 6—8 pairs.....5. *latior*.

Bracts rather large, scarious-margined, and usually coloured, prominently nerved:—

Barren bracts broadly attached at base to the rhachis of the spike and decurrent, imbricate in 2 series, one sided, flowering bracts not broadly attached, all shining, not mucronate, bracteoles small; leaves large, thin, oblong-lanceolate, acuminate at both ends, up to 6 in. long, 1·75 in. broad, the main nerves about 6—8 pairs.....6. *sispænsis*.

Barren bracts and flowering bracts thin and chaffy, attached at a point, the latter broader and broader-margined, both ciliate and long-mucronate, not markedly 1-sided, bracteoles lanceolate, small; leaves ovate, acute, rounded at base and then decurrent, up to 5 in. long, 2 in. broad, main nerves 7—9 pairs

7. *laeta*.

Barren and flowering bracts very different, the former in 2 rows on one side of the spike, thick, elliptic, mucronate, narrowly margined, the latter with the flowers on the other side conspicuously hyaline-margined, obovate or orbicular, ciliate, variously clothed; leaves various, ovate or lanceolate or even linear-spathulate.....8. *parviflora*.

1. *RUNGIA LINIFOLIA*, Nees; F. B. I. iv. 548. *Rostellularia gracilis*, Wt. Ic. t. 1541.

Mysore, at Aglati, 3,500 ft. (Meebold in Hb. Calc.).

A very slender herb, erect but often rooting from lower nodes, the anthers not appendaged at base, the flowers said to be pale purple.

2. *RUNGIA APICULATA*, Bedd. Ic. t. 247; F. B. I. iv. 548.

W. Ghâts, hills of Madura and Tinnevely, at 2,000—5,000 ft., in the beds of streams.

A slender undershrub, rooting at lower nodes, then erect, the corollas white with lilac spots, the seeds minutely tuberculate.

3. *RUNGIA REPENS*, Nees ; F. B. I. iv. 549 ; Wt. Ic. t. 465.
N. Circars, in Godavari and Kistna ; Deccan and N. Carnatic, in all Districts, west to the foot of the Gháts.
A decumbent or erect, often rooting, herb with angular zigzag stems and conspicuous spikes often 4 in. long, the bract-margins hyaline ; flowers white, blue or pink ; seeds concentrically ridged.
4. *RUNGIA WIGHTIANA*, Nees ; F. B. I. iv. 546 ; Wt. Ic. t. 1549. *R. Arnothiana*, Wt. Ic. t. 1550.
W. Gháts, Anamalais and hills of Tinnevely and Travancore, 2,000—5,000 ft.
An erect undershrub with white flowers, the lower lip veined with lilac, the seeds minutely tuberculate.
5. *RUNGIA LATIOR*, Nees ; F. B. I. iv. 546 ; Wt. Ic. t. 548. *R. longifolia* var. *latifolia*, C. B. Clarke ; F. B. I. iv. 547.
W. Gháts, Nilgiris, Anamalais and hills of Travancore, at about 3,000—6,000 ft.
A stout erect herb with white or pale blue flowers, the leaves reticulately nerved.
6. *RUNGIA SISPAESENSIS*, T. And. ; F. B. I. iv. 546.
W. Gháts, Nilgiris, Anamalais and hills of Coimbatore and Malabar, at 3,000—4,000 ft.
A shrubby nearly glabrous plant with one-sided spikes and purplish bracts, the seeds minutely tuberculate in concentric lines.
7. *RUNGIA LAETA*, C. B. Clarke ; F. B. I. iv. 546.
W. Gháts, Pulney Hills and hills of Madura and Travancore, at 5,000—7,000 ft.
A shrubby plant with stout terete zigzag stems and white flowers with purple spots, the seeds minutely tuberculate in concentric lines.
8. *RUNGIA PARVIFLORA*, Nees ; F. B. I. iv. 550. *R. longifolia*, Bedd. Ic. t. 266, *not of* Nees.
W. Coast and lower parts of W. Gháts in Madura, Tinnevely and Travancore, in dry forests in the low country.
A small soft herb with membranous leaves and small spikes of blue flowers, the fertile bracts glabrous except the ciliate margins. The small plant from Ceylon (Bedd. Ic. t. 266) with linear spathulate leaves has been found at Kolatoor in Travancore (Bourdillon).
Var. *pectinata*, C. B. Clarke *l.c.* *R. pectinata*, Nees ; Wt. Ic. t. 1547. Larger and with larger and broader spikes and larger leaves, the floral bracts villous, the barren bracts prominently pectinately arranged.
All Districts, in fairly moist places, along streams and in forest undergrowth and grassy pasture lands, up to 4,000 ft. in the hills.
Var. *muralis*, C. B. Clarke *l.c.* Much smaller, many branched, with very small ovate or orbicular leaves and rather long dense-flowered secund strobiliform spikes, the barren bracts scarcely longer than the almost woolly fertile ones.
W. Coast, S. Canara to Travancore, on dry fields and on walls.
Var. *monticola*, Gamble. Erect, almost an undershrub, with strigosely villous stems and leaves, the latter ovate up to about 1 in.

long; spikes short, about .5 in. long, barren bracts long-mucronate, longer than the very white woolly fertile ones; flowers bright blue.

N. Circars, top of Mahendragiri at 4,500 ft. (Gamble, Fischer and Gage); Karimalai and Ayinalai hills of Malabar, at 4,000—5,000 ft. (Fischer), on rocks and among grass.

32. *Dicliptera*, Juss.

Erect or diffuse herbs. *Leaves* entire or undulate, lineolate. *Flowers* sessile or subsessile, in axillary or terminal clusters or panicles of cymes, often with imperfect flowers or flowerless bracts added, one or more enclosed within a pair of opposite inflorescence bracts; flowering bracts smaller and in often unequal pairs; bracteoles linear, about equalling the similar *calyx*-lobes. *Corolla* white, pink or red, purple-spotted; tube slender, limb 2-lipped, the upper lip narrow, entire or emarginate, the lower 3-lobed recurved. *Stamens* 2; anthers 2-celled, the cells superposed, muticous. *Ovary* 2-celled; 2 ovules in each cell; style filiform; stigma bifid. *Fruit* a clavate capsule with a solid stalk; placentas separating elastically from the base after dehiscence. *Seeds* ovoid or orbicular, compressed, verrucose or glandular-papillose, the papillæ sometimes glochidiate.

Flowers in slender divaricately branched panicles, the inflorescence bracts lanceolate but gradually reduced in size to minutely linear; flowering bracts and bracteoles minute, like the calyx-lobes, .05—1 in. long; leaves ovate, acuminate, membranous, nearly glabrous, up to 5 in. long, 2—3 in. broad, long-petioled

1. *parvibracteata*.

Flowers in lax panicles with white-hairy branches, the inflorescence bracts linear oblong, mucronate, ciliate, gradually reduced to linear, flowering bracts spatulate, bracteoles linear lanceolate as are the rather smaller calyx-lobes; leaves ovate, acuminate, minutely pubescent, up to 5.5 in. long, 3.25 in. broad, long-petioled

2. *Beddomei*.

Flowers in clusters in few-flowered axillary umbels, bracts at the base of the umbel small, linear or spatulate, those below the clusters broadly ovate or subcordate, mucronate, reticulate, glabrous or pubescent, about .5 in. in diam., bracteoles linear, shorter than the scarious ciliate calyx-lobes; leaves ovate or lanceolate, acuminate at both ends, membranous, up to 5 in. long, 2.5 in. broad, long-petioled.

3. *zeylanica*.

Flowers in subcapitate peduncled clusters, one or more together in the leaf-axils, bracts of the clusters small, linear, those of the flowers obovate-oblong, up to .6 in. long, bracteoles linear like the calyx-lobes; leaves ovate or elliptic, acuminate, acute or rounded at base, glabrous, up to 3.5 in. long, 1.5 in. broad, long-petioled.

4. *cuneata*.

Flowers in dense terminal and axillary sessile or subsessile capitate cymes, the bracts obovate or oblanceolate, glandular-pubescent, unequal; leaves rhomboid- or elliptic-lanceolate, acuminate at both ends, undulate, membranous, up to 4.5 in. long, 2 in. broad, long-petioled.

5. *bupleuroides*.

1. *DICLIPTERA PARVIBRACTEATA*, Nees; F. B. I. iv. 551.

N. Circars, in Jaipur Hills (Beddome), Rampa Hills of Godavari, at 2,000 ft. (Gamble).

A tall slender herb with elongate trichotomous cymes of apparently pink flowers.

2. *DICLIPTERA BEDDOMEI*, C. B. Clarke; F. B. I. iv. 551.

Deccan, Nallamalai Hills of Kurnool (Beddome).

A slender herb with flowers in rather short trichotomous cymes.

3. *DICLIPTERA ZEYLANICA*, Nees ; F. B. I. iv. 552. *D. bivalvis*, Nees ; Wt. Ic. t. 1551.
W. Gháts, S. Canara to Travancore, in evergreen forests, at 2,000—3,000 ft.
A well-marked subscandent (Cooke) herb with conspicuous bracts and deep rose-coloured flowers, the seeds minutely glochidiate-papillose. The stems vary in pubescence from glabrous to densely white-woolly.
4. *DICLIPTERA CUNEATA*, Nees ; F. B. I. iv. 552 ; Wt. Ic. t. 1552.
Deccan, Horsleykonda in Chittoor, at 4,000 ft. (Fischer), hills of N. Coimbatore ; Carnatic, hills of Salem, Trichinopoly and Madura to S. Travancore ; W. Gháts in Wynaad, about 3,000 ft.
A branching herb with, apparently, pink flowers, the seeds glochidiate-papillose.
5. *DICLIPTERA BUPLEUROIDES*, Nees. *D. Roxburghiana* var. *bupleuroides*, C. B. Clarke ; F. B. I. iv. 554.
N. Circars, hill forests of Ganjam, about 1,500 ft. (Gamble, Barber).
An erect or tufted herbaceous plant with white flowers spotted with purple.

33. *Ecbolium*, Kurz.

Shrubs, nearly glabrous. *Leaves* entire. *Flowers* in dense terminal spikes ; bracts large, leafy, imbricate, sometimes toothed ; bracteoles small, narrow. *Calyx* 5-partite, connate below ; lobes linear. *Corolla*-tube very long and slender ; limb 2-lipped, the upper lip narrow, shortly 2-fid, the lower 3-lobed with broad pendent lobes. *Stamens* 2, attached near the top of the tube ; anthers 2-celled, linear, parallel, muticous. *Ovary* 2-celled ; ovules 2 in each cell ; style filiform ; stigma shortly 2-fid. *Fruit* an ovoid compressed capsule narrowed into a solid stalk. *Seeds* 4 or, more often, 2, large, compressed, tuberculate and scabrous, the retinacula long and curved.

ECBOLIUM LINNEANUM, Kurz ; F. B. I. iv. 544 ; Wt. Ic. t. 463. Deccan and Carnatic, inland to Coimbatore, otherwise chiefly from Madras southwards.

A low shrub with bluish-green corolla, the bracts obtuse or slightly acute, the spikes short and leaves small and pubescent. The leaves are used in medicine. Vern. *Hind.* Udu jati.

Var. *rotundifolium*, C. B. Clarke l.c. Leaves small sessile, ovate ; bracts shortly aristate.

Deccan, about Coimbatore (Wight).

Var. *laetevirens*, C. B. Clarke l.c. Leaves glabrescent, longer and larger and more acuminate, more prominently nerved ; spikes long, up to 8 in., bracts broadly lanceolate, aristate.

W. Gháts, in all Districts, at low levels, common.

Var. *dentatum*, C. B. Clarke l.c. Leaves glabrous, larger still and much attenuate at base, spikes long, bracts ovate acuminate, dentate. N. Circars, Ganjam to Godavari, in forest areas chiefly.

34. *Justicia*, Linn.

Herbs, undershrubs or shrubs. *Leaves* entire, usually lincolate with often very many raphides. *Flowers* sessile or subsessile, in spikes or panicles, rarely solitary; bracts various, bracteoles usually narrow, sometimes 0. *Calyx* 5- or 4-partite, the lobes narrow. *Corolla*-tube as long as or shorter than the limb; limb 2-lipped, the upper lip 2-lobed or sub-entire, the lower 3-lobed, the lobes imbricate in bud. *Stamens* 2; filaments often dilated; anthers 2-celled, the cells round or oblong usually more or less separate, the lower always with a white basal appendage. *Ovary* 2-celled; ovules 2 in each cell; style filiform; stigma shortly 2-fid. *Fruit* an ovoid or obovoid capsule, solid at base or not, often papery. *Seeds* 4, ovoid or suborbicular, more or less compressed, tuberculate rugose or echinate, not hygroscopically hairy.

Calyx-lobes 5, equal or nearly so:—

Erect shrubs; flowers large, in opposite clusters in elongate, often paniculate, spikes or racemes; capsule clavate, 4-seeded near the top, about 1 in. long; leaves oblong-lanceolate, obtusely acuminate at apex, acuminate at base, glabrous, up to 10 in. long, 3.5 in. broad, main nerves about 10 pairs.....1. *montana*.
Shrubs or herbs; flowers middle-sized, in continuous spikes with conspicuous imbricate bracts:—

Bracts white with green nerves, bracteoles similar:—

Flower spikes large and conspicuous, terminal, often panicled; bracts .5—75 in. long:—

Tall shrub, sometimes branching and decumbent; leaves petioled, ovate or lanceolate, acuminate, shortly attenuate at base, glabrous or villous beneath, entire or crenate-dentate, up to 6 in. long, 3 in. broad; capsule .3—5 in. long, clavate, pubescent, the seeds small, spinulose when wetted.....2. *Betonica*.

Low procumbent much-branched undershrub; leaves sessile, oblong, obtuse or emarginate, nearly glabrous, entire, up to 2 in. long, .2—5 in. broad; capsule .75 in. long, clavate, puberulous, the seeds large, echinate when wetted.....3. *nilgherrensis*.

Flower spikes small and slender; bracts about .25 in. long, narrow; leaves ovate or oblong, sometimes linear, up to 1.5 in. long, .4 in. broad; capsule .5 in. long, pubescent, the seeds small, softly tuberculate when wet.....4. *trinervia*.

Bracts green; bracteoles different, often 0; the seeds softly echinate when wet:—

Stiff undershrubs with white bark and small leaves:—

Branches softly white-hairy; bracts elliptic, acute, about .1—2 in. long, bracteoles more oblong, usually longer, both minutely puberulous; spikes few-flowered; leaves oblong or spatulate, obtuse, .5—75 in. long; capsule .5 in. long, softly pubescent.....5. *salsoloides*.

Branches glabrous except sometimes the uppermost branchlets; bracts orbicular or obcordate, short-apiculate, pubescent, .15—25 in. in diam., bracteoles linear or slightly elliptic, shorter; spikes short or elongate, many-flowered; leaves obovate or orbiculate, pubescent, up to 1 in. in diam.; capsule .3 in. long, glabrous.....6. *tranquebariensis*.

Erect or diffuse herb with purplish bark and puberulous stems; leaves ovate or orbicular, obtuse or acute, petioled, up to 3 in. long, 2 in. broad; bracts orbicular-spatulate, bracteoles small linear, sometimes absent; spikes sometimes short, usually long and many-flowered; capsules obovoid, glabrous except at tip, .25 in. long.....7. *glauca*.

Erect undershrubs with small or middle-sized flowers in axillary or terminal branched often paniculate spikes, the bracts inconspicuous and narrow:—

Flowers clustered in the spikes; bracts linear, very small, bracteoles 0; leaves short-petioled, narrowly lanceolate, glabrous, up to 5 in. long, 1 in. broad, main nerves about 7 pairs, not conspicuous; capsule glabrous, .5 in. long, seeds unknown.....8. *Gendarussa*.

Flowers opposite in the spikes; bracts linear-lanceolate, bracteoles linear, small; leaves long-petioled, elliptic, acuminate at both ends, glabrous or pubescent, up to 8 in. long, 3 in. broad, main nerves 8—10 pairs, prominent; capsule 4-sided, clavate, very villous, .7 in. long, seeds softly round-tuberculate.

9. *wynadensis*.

Herbaceous plant with flowers in lax axillary and terminal cymes, the bracts and bracteoles very small, linear; leaves broadly ovate, acute, obtuse or even subcordate at base and then acute into the long petiole, glabrous, minutely lineolate, up to 4 in. long, 3 in. broad, main nerves about 6—7 pairs; capsule 4-sided, clavate, villous, the seeds very villous, on jointed retinacula...

10. *glabra*.

Calyx-lobes 4; herbs and undershrubs with small flowers in terminal and axillary cylindric or linear spikes:—

Spikes cylindric, hairy; bracts and bracteoles as long as or longer than the calyx-lobes:—

Bracts and bracteoles very slender and long, with distant spreading long bulbous-based white hairs; calyx-lobes similar or only apiculate, their margins scarious; spikes up to 1.5 in. long, .4 in. broad; leaves thin, ovate or elliptic, up to 2 in. long, the raphides irregular in the middle, transverse at the margins.....

11. *micrantha*.

Bracts and bracteoles linear, green, pectinately white-ciliate and scabrous-hirsute; calyx-lobes narrowly lanceolate, the margins only scarious, the raphides concentrically transverse and curved:—

Spikes scarcely 1 in. long, .25 in. broad, usually pale; leaves elliptic lanceolate or linear, up to 2.5 in. long; white hairs of the bracts and bracteoles short and close.....

12. *procumbens*.

Spikes up to 2 in. long, .2 in. broad; leaves very small, orbicular, under .7 in. in diam., the white jointed hairs long and spreading.....

13. *serpyllifolia*.

Bracts elliptic-ovate or lanceolate, the bracteoles narrower though similar; leaf raphides concentrically transverse:—

Erect, simple-stemmed, the leaves sessile, oblong, subobtus; spikes up to 2.5 in. long, .4 in. broad; bracts, bracteoles and calyx-lobes pectinately white-setulose.....

14. *Notha*.

Diffuse and branching, the branches often angled or zigzag:—

Bracts more than 1 in. broad, lineolate, bracteoles and similar calyx-lobes narrower, all scarious-margined and with soft whitish jointed hairs; leaves ovate or oblong even sometimes almost linear, up to about 1 in. long, main nerves about 6 pairs; plant pale when dry.....

15. *simplex*.

Bracts less than 1 in. broad, but broader than the bracteoles and calyx-lobes, more or less pectinately ciliate; leaves ovate or elliptic, up to 2 in. long, 1 in. broad, main nerves about 4 pairs; nearly black when dry.

16. *latispica*.

Spikes linear; bracts and bracteoles usually shorter than the calyx-lobes, all with a green midrib and scarious margins:—

Bracts, bracteoles and calyx-lobes obtuse at apex; leaves elliptic-oblong or lanceolate, obtuse at apex, attenuate at base into the petiole, the raphides scattered, straight, parallel to the 4—5 main nerves; spikes slender, often very long, the whorls distant.....

17. *quinqueangularis*.

Bracts, bracteoles and calyx-lobes acute at apex:—

Bracts and bracteoles lanceolate nearly 1 in. long but much shorter than the calyx-lobes, more or less scabrous:—

Prostrate and rooting many-branched herbs, sometimes becoming woody; spikes short; the leaves very small, orbicular or ovate, rarely over .5 in. long, the raphides scattered ascending.....

18. *prostrata*.

Erect tall slender branching herbs; spikes long and pale; leaves narrowly linear or lanceolate, up to 3 in. long, .5 in. broad, the lower ones sometimes ovate, the raphides numerous ascending.....

19. *Vahl.*

Bracts and bracteoles usually very small and ovate, scarcely .05 in. long, and with the calyx-lobes generally glabrous; spikes very slender up to 2 in. long; leaves usually thin, ovate, obtuse or acute, up to 2.5 in. long, 1.25 in. broad, the raphides irregular.....

20. *diffusa*.

Bracts and bracteoles lanceolate, hirsute, a little shorter than the calyx-lobes, all with cuspidate long-ciliate tips and narrow scarious margins; leaves

ovate or orbicular, obtuse, with strigose hairs above, villous beneath, up to nearly 2 in. long, 1 in. broad, the raphides irregular.....21. *orbiculata*.

1. *JUSTICIA MONTANA*, Wall.; F. B. I. iv. 525. *Hemichoriste montana*, Nees; Wt. Ic. t. 1538.

W. Gháts, Mysore, Coorg, Wynaad, to the Anamalais and hills of Travancore, at low levels in evergreen forest.

An erect bush with thick stem, the corolla white with purple spots in the throat, the seed-testa corrugately wrinkled.

2. *JUSTICIA BETONICA*, Linn.; F. B. I. iv. 525.

All Districts, except very dry ones, on waste lands and in hedges.

An erect shrub, up to 4 ft. high, the corolla white, spotted with pink.

Var. *villosa*, C. B. Clarke. Stem and leaves beneath villous, bracts large.

N. Circars, Ganjam to Godavari, up to 4,500 ft. on Mahendragiri.

3. *JUSTICIA NILGHERRENSIS*, Wall.; F. B. I. iv. 526. *Adhatoda nilgherrensis*, Nees; Wt. Ic. t. 1544.

Carnatic, Melpat, S. Arcot, at 2,500 ft. (Barber); W. Gháts, Nilgiris, in grass lands on the downs above 6,000 ft.

A low herb branching from a stout rootstock, the corolla whitish, spotted with red.

4. *JUSTICIA TRINERVIA*, Vahl; F. B. I. iv. 526.

W. Coast, S. Canara and Malabar; Deccan, in Mysore.

A low procumbent herb, branching from a woody root-stock, the bracts and bracteoles often scarcely white, the corolla small.

5. *JUSTICIA SALSOLOIDES*, T. And.; F. B. I. iv. 530.

Carnatic, on very dry lands (Wight, G. Thomson).

A woody undershrub, the corolla densely pubescent without.

6. *JUSTICIA TRANQUEBARIENSIS*, Linn. f.; F. B. I. iv. 530.

Deccan and Carnatic, from Mysore southwards, on dry lands, up to 3,000 ft. in hilly country.

A woody undershrub with many stiff branches, the corolla slightly villous without, yellowish with purple spots.

7. *JUSTICIA GLAUCA*, Rottl.; F. B. I. iv. 529. *Gendarussa tranquebariensis*, Wt. Ic. t. 462, *not of* Nees.

All Districts, on waste lands and in dry forests, up to 2,000 ft.

A very variable herb, with pubescent branches, the corolla whitish with purple spots.

8. *JUSTICIA GENDARUSSA*, Linn. f.; F. B. I. iv. 532. *Gendarussa vulgaris*, Nees; Wt. Ic. t. 468.

W. Gháts, valleys in the hills of Madura, cultivated and frequently found run wild.

An erect undershrub, the corolla white or rose with purple spots. The plant is used in garden hedges, and the leaves are much used medicinally. Vern. *Tel.* Nalla vavili; *Tam.* Karu nochi.

9. *JUSTICIA WYNAADENSIS*, Heyne; F. B. I. iv. 533. *Adhatoda wynaadensis* Nees; Wt. Ic. t. 1545.

W. Gháts, from S. Canara and Coorg to Wynaad, E. Nilgiris

and S. Malabar Hills, up to 3,000 ft., in evergreen forests and on waste lands.

An erect undershrub, the corolla with pink upper and brown-purple lower lip, the spikes long and slender with flowers in distant pairs.

10. *JUSTICIA GLABRA*, Koen.; F. B. I. iv. 535. *Rhaphidospora glabra*, Nees; Wt. Ic. t. 1554.

N. Circars, in Godavari; Deccan, in Kurnool and the Sandur Hills of Bellary, hills of Coimbatore and Salem; Carnatic, in Tinnevely, in hedges and open forest.

An erect herb with slender divaricately branched inflorescence, the corolla pale yellow with purple spots.

11. *JUSTICIA MICRANTHA*, Wall.; F. B. I. iv. 536.

Deccan, in Bellary and Cuddapah to Chingleput.

An erect herb with trichotomous pale zigzag-branching stems and small rose-purple flowers, the small capsule pubescent.

12. *JUSTICIA PROCUMBENS*, Linn.; F. B. I. iv. 539.

W. Ghâts, from the slopes of the Pulneys southwards, W. Coast to Travancore.

A diffuse slender herb with many branches often rooting at the nodes, the flowers pale purple, the capsule pubescent at tip.

13. *JUSTICIA SERPYLLIFOLIA*, Gamble n. comb. *J. simplex* var. *serpyllifolia*, C. B. Clarke; F. B. I. iv. 539.

W. Coast, S. Canara and Malabar.

A small prostrate or straggling diffuse herb often rooting at the nodes, with slender zigzag branches, the spikes close and cylindrical.

14. *JUSTICIA NOTHA*, C. B. Clarke; F. B. I. iv. 537. *Rostellularia simplex*, Wt. Ic. t. 1542.

"Station not known (Wt.)." Clarke thinks it may be Malayan, but it is not recorded by Miquel.

15. *JUSTICIA SIMPLEX*, D. Don; F. B. I. iv. 539.

Deccan, Carnatic and W. Ghâts, usually in hilly country and even up to 7,000 ft., common.

A pale softly hairy herbaceous branching plant, the flowers pale pink or lilac, the capsules papery, villous at apex.

16. *JUSTICIA LATISPICA*, Gamble n. comb. *J. procumbens* var. *latispica*, C. B. Clarke; F. B. I. iv. 539. *Rostellularia procumbens*, Wt. Ic. t. 1539.

W. Ghâts, Nilgiri Hills above 5,000 ft., less common in Anamalais and Pulneys.

Almost an undershrub somewhat woody below, turning nearly black when dry, covered with scattered stiff strigose hairs, the flowers apparently pale lilac spotted white, the capsules papery, glabrous.

17. *JUSTICIA QUINQUEANGULARIS*, Koen.; F. B. I. iv. 536.

N. Circars, Biccavol in Godavari (Bourne).

A herbaceous undershrub with curving angular stems rooting at the nodes and giving erect branches, the flowers small, the

capsules obovoid glabrous, the seeds with wavy subconcentric ridges.

18. *JUSTICIA PROSTRATA*, Gamble n. comb.; *J. diffusa*, Willd.; var. *prostrata*, C. B. Clarke, F. B. I. iv. 538.

Circars and Carnatic, from Ganjam southwards to S. Travancore, usually in sandy places near the coast, but sometimes inland to Salem, Trichinopoly and Coimbatore. A small pale prostrate plant, the branches long and diffusely spreading from a stout rootstock sometimes almost woody, the flowers pale pink, the capsules small and minutely puberulous, the seeds minutely tuberculate. The leaves are small and usually orbicular or ovate, sometimes slightly lanceolate.

19. *JUSTICIA VAHLII*, Roth. *J. diffusa* var. *VahlII*, C. B. Clarke; F. B. I. iv. 538.

Circars and Deccan, westwards to Bellary, up to 4,000 ft. in the hills.

A tall straggling narrow-leaved plant from a stout rootstock, the branches with long internodes angular and scabrous, the flowers pale with a reddish lip, the capsule pubescent, the seeds papillose.

20. *JUSTICIA DIFFUSA*, Willd.; F. B. I. iv. 538.

Circars, Deccan and Carnatic, also, but more scarce, W. Gháts, up to 7,000 ft. in places.

A slender but sometimes in old plants quite woody branching herb, with pale flower spikes and leaves, the glabrous capsules small and pointed.

Var. *hedyotidifolia*, C. B. Clarke; F. B. I. iv. 538. *Rostellularia hedyotidifolia*, Nees; Wt. Ic. t. 1540. Leaves thicker and like other parts turning nearly black in drying; spikes broader and denser.

Deccan, on Horsleykonda, 4,500 ft. (Gamble); W. Gháts, Nilgiris, Pulneys and hills of Travancore, about 3,000—5,000 ft.

21. *JUSTICIA ORBICULATA*, Wall. *J. diffusa* var. *orbiculata*, C. B. Clarke, F. B. I. iv. 538.

W. Gháts, Nilgiri and Pulney Hills, probably above 5,000 ft.; Shevaroy Hills of Salem (Bourne).

Almost an undershrub, soft and compact, with spreading dichotomous branches, the capsules nearly or quite glabrous, the seeds with lines of papillae.

35. *Adhatoda*, Nees.

Shrubs. Leaves entire. Flowers subsessile in the axils of opposite bracts in dense axillary and terminal often thyrsiform spikes; bracts herbaceous, bracteoles similar but usually narrower. Calyx 5-partite, the lobes imbricate, the 2 lowest often subconnate. Corolla-tube short; limb 2-lipped, the upper lip galeate subentire, the lower spreading, 3-lobed. Stamens 2, near the top of the corolla-tube; anthers 2-celled, the cells minutely apiculate at base. Disk cup-shaped. Ovary 2-celled; ovules 2 in each cell; style filiform; stigma entire. Fruit a clavate capsule with a long solid base. Seeds 1 or 2, suborbicular, compressed, rugose.

Branches grey-pubescent; spikes stout, about 3 in. long; bracts elliptic, up to 1 in. long, about 7-ribbed; leaves lanceolate, acuminate at both ends, minutely puberulous, up to 8 in. long, 3 in. broad, main nerves about 15 pairs, rather close.....1. *Vasica*.
Branches glabrous; heads short, up to 1 in. diam.; bracts ovate, up to .5 in. long, obscurely 5-ribbed; leaves oblong-lanceolate, attenuate at both ends, minutely puberulous on the nerves, up to 6 in. long, 1.5 in. broad, main nerves about 8 pairs, rather distant.....2. *Beddomei*.

1. *ADHATODA VASICA*, Nees; F. B. I. iv. 540.

All plains Districts, perhaps wild in the N. Circars, elsewhere cultivated as a hedge-plant and run wild near villages.

A dense shrub with a foetid scent, the flowers white with the throat barred with red or yellow. The leaves are used in native medicine, and an infusion of them is used as an insecticide. Vern. *Hind.* Arusha; *Ur.* Basung; *Tel.* Addasaram; *Tam.* Adatodai.

2. *ADHATODA BEDDOMEI*, C. B. Clarke; F. B. I. iv. 540.

Hills of S. Travancore, at 3,000 ft. (Beddome).

A very large shrub, with rather small flowers in short heads; turns black in drying.

36. *Dianthera*, Linn.

Diffuse herbs or undershrubs. *Leaves* petioled, ovate or oblong. *Flowers* in terminal and sometimes axillary spikes or panicles; bracts and bracteoles small. *Calyx* 5-partite, the lobes narrow. *Corolla* small or middle-sized, the tube short; limb 2-lipped, the upper lip suberect, emarginate, the lower 3-lobed, pendent. *Stamens* 2; anther-cells 2, ellipsoid, subopposite or superposed, muticous. *Ovary* 2-celled, 2 ovules in each cell; style minutely hairy below, nearly bifid at tip. *Fruit* a clavate capsule with subcylindric solid base. *Seeds* 4, compressed, scabrous verrucose or subhispid.

DIANTHERA WALLICHII, Benth. in Gen. Pl. ii. 1114. *D. leptostachya*, C. B. Clarke; F. B. I. iv. 542. *Leptostachya Wallichii*, Nees; Wt. Ic. t. 1543.

W. Ghâts, hills of Tinnevely.

An erect herb with slender divaricately branched panicles of small flowers, the leaves membranous, elliptic-oblong or lanceolate, acuminate at both ends, up to 7 in. long, 2.5 in. broad.

37. *Rhinacanthus*, Nees.

Shrubs, sometimes subscandent. *Leaves* entire. *Flowers* solitary or in small cymes in dense or divaricate panicles; bracts and bracteoles small, linear-lanceolate, shorter than the calyx. *Calyx* 5-lobed, the lobes narrow. *Corolla*-tube long, very slender, scarcely enlarged above; limb 2-lipped, the upper lip linear-oblong, entire or shortly 2-lobed, twisted or recurved, the lower broad, 3-lobed. *Stamens* 2, adnate near the top of the corolla-tube; anthers 2-celled, the cells superposed, muticous. *Disk* cupular. *Ovary* 2-celled; ovules 2 in each cell; style filiform; stigma minutely 2-fid. *Fruit* a clavate capsule, contracted below in a long solid stalk. *Seeds* 1 or 2, orbicular, compressed, rugose.

RHINACANTHUS COMMUNIS, Nees; F. B. I. iv. 541; Wt. Ic. t. 464.

Almost all Districts, wild or cultivated, common on roadsides; also in forest glades especially in N. Circars, on the hills to 4,500 ft. as on Mahendragiri.

A shrubby plant reaching 5 ft. in height, with leaves sometimes reaching 8 in. long, 4 in. broad, the flowers white.

Var. *montana*, C. B. Clarke. Leaves ovate, very softly pubescent beneath and rounded at base.

Nilgiri Hills, near Coonoor (Wight).

38. *Peristrophe*, Nees.

Erect herbs. *Leaves* entire, lineolate. *Flowers* in terminal or axillary clusters, which are often in spreading lax panicles; bracts 1—4 together, decussate, longer than the calyces or the similar bracteoles. *Calyx* 5-partite; lobes linear-lanceolate. *Corolla*-tube slender, often twisted; limb 2-lipped, the upper lip subentire, the lower shortly 3-lobed. *Stamens* 2; filaments pubescent below; anthers 2-celled, cells linear or ovoid, one higher than the other, muticous. *Ovary* 2-celled; ovules 2 in each cell; style filiform; stigma shortly bifid. *Fruit* an ellipsoid stalked capsule, usually 4-seeded, the placentas not separating elastically. *Seeds* discoid, compressed, papillose.

A laxly paniculate spreading herb with angular hispid stems, the leaves chiefly near the base, ovate, acuminate, up to 2 in. long, pubescent; cymes trichotomous; bracts 2, unequal, opposite, linear or linear-spathulate, up to .5 in. long; corolla pink, villous without, up to .5 in. long; anther-cells short; seeds glochidiatopapillose.....1. *bicalyculata*.

An erect herb or undershrub with nearly terete stems, the leaves chiefly near the top, elliptic, long-acuminate, subglabrous, up to 7 in. long, 2.5 in. broad, the flower-clusters in axillary or terminal 3—5-branched cymes; bracts 2, conspicuous, elliptic, glabrous or slightly villous, nerved, up to .75 in. long; corolla pink, villous without, 2—2.5 in. long; anther-cells linear; seeds granular-papillose...2. *montana*.

1. *PERISTROPHE BICALYCULATA*, Nees; F. B. I. iv. 554.

All Districts, common in forest undergrowth, in hedges and on waste land, even as a weed in gardens.

A hispid herb 3—6 ft. high with unattractive very spreading flower panicles and rather small leaves.

2. *PERISTROPHE MONTANA*, Nees; F. B. I. iv. 556; Wt. Ic. t. 1553.

W. Gháts, Wynaad, Anamalais, hills of Travancore and Tinnevely, in evergreen forests at low levels up to 3,000 ft.

A handsome erect undershrub with large leaves and flowers, the bracts often also coloured.

Graptophyllum hortense, Nees, is a glabrous shrub with crimson flowers and leaves mottled with white patches. It is largely cultivated in gardens and has occasionally run wild.

Family CXIV. VERBENACEAE.

Herbs, shrubs or trees. *Leaves* opposite or whorled, simple digitate or pinnate; stipules 0. *Inflorescence* cymose racemose or spicate, often paniculate; bracts usually small; flowers hermaphrodite, rarely polygamous, generally irregular, often brightly coloured, sometimes with coloured calyx or enlarged coloured involucre. *Calyx* inferior,

gamosepalous, 5—4- rarely more-lobed, persistent. *Corolla* gamopetalous; tube usually cylindric or dilated above, often curved; limb 2-lipped or subequally lobed, lobes 5—4, rarely more. *Stamens* usually 4 didynamous, rarely 2, rarely more, inserted on the corolla-tube; filaments free; anthers 2-celled. *Ovary* superior, sessile, 2—4-celled, entire or 4-lobed; ovules variously attached, 2, sometimes 1 in each cell; style terminal; stigma entire or bifid. *Fruit* drupaceous with bony pyrenes, or capsular, 1—4-celled; mesocarp usually fleshy; endocarp usually bony. *Seeds* erect or pendulous, separate in distinct cells; albumen usually 0, embryo straight, radicle inferior.

Inflorescence spicate, centripetal (the lowest flowers opening first):—

Fruit with 2 or 1 1-seeded pyrenes:—

Spikes capitate ovoid or cylindric, calyx small; stamens 4.

Calyx truncate or obscurely lobed; fruit drupaceous, succulent...1. *Lantana*.

Calyx 2—4-lobed; fruit dry, hard.....2. *Lippia*.

Spikes long, slender; calyx long, tubular:—

Stamens 4 didynamous.....3. *Bouchea*.

Stamens 2.....4. *Stachytarpheta*.

Fruit with 2 2-seeded pyrenes.....5. *Priva*.

Fruit with 4 1-seeded pyrenes; calyx tubular.....*Verbena*.

Inflorescence cymose, centrifugal (the end flower opening first):—

Cymes paniculate, drupes fleshy:—

Leaves simple:—

Corolla regular, stamens equal:—

Flowers 4-merous; drupe with 4 pyrenes.....6. *Callicarpa*.

Flowers 4—6-merous; drupe with 4-celled endocarp.....7. *Tectona*.

Corolla 2-lipped; stamens 4 didynamous:—

Drupe with 1 pyrene, normally 4-celled:—

Flowers small.....8. *Premna*.

Flowers large.....9. *Gmelina*.

Drupe with 4 pyrenes, 1—3 often suppressed.....10. *Clerodendron*.

Leaves digitate; pyrene 1.....11. *Vitex*.

Cymes capitate, bracts of the heads forming an involucre:—

Corolla 6—16- or more-merous; stamens long-exsert.....12. *Symphorema*.

Corolla 5—6-merous; stamens included or shortly exsert.....13. *Sphenodesme*.

Inflorescence capitate or shortly spicate, centripetal; calyx 5-partite, the lobes concave, imbricate, fruit capsular.....14. *Avicennia*.

1. *Lantana*, Linn.

Erect or subscandent, often rambling, often strong-smelling, pubescent or scabrous shrubs; branches 4-angled, sometimes prickly. *Leaves* simple, opposite or ternate, crenate, often rugose. *Flowers* in pedunculate capitate ovoid or cylindric spikes; bracts conspicuous, persistent, bracteoles 0. *Calyx* small, membranous, truncate or obscurely toothed. *Corolla*-tube cylindric, slender; limb salver-shaped; lobes 4 or 5, spreading. *Stamens* 4, didynamous, included in the corolla-tube and inserted at its middle; anthers oblong, the cells parallel. *Ovary* 2-celled; ovules 1 in each cell; style short; stigma oblique, subcapitate. *Fruit* a drupe with more or less fleshy mesocarp; endocarp hard, separating into 2 1-celled, 1-seeded pyrenes. *Seeds* exalbuminous; testa reticulate.

Erect shrubs, the stems not prickly:—

Leaves usually opposite, sometimes ternate:—

Lower bracts of the spike broadly ovate, usually abruptly acuminate, villous, 7-ribbed; spikes 5—75 in. long in flower, elongating in fruit; corolla-tube

.3 in. long; leaves ovate, acute, rounded and then cuneate at base, crenate, rugose above, usually white-pubescent beneath, up to 3 in. long, 1.5 in. broad

1. *indica*.

Lower bracts of the spike leafy, ovate, gradually acute, 5—7-ribbed, softly villous; spikes small, about .5 in. long or less, in fruit up to 1 in.; corolla-tube short, .15 in. long; leaves small, ovate or orbicular, obtuse or obtusely acute, crenulate, often very white villous or tomentose, up to 1.5 in. long, but usually much less.....2. *Wightiana*.

Lower bracts of the spike lanceolate, 3-ribbed; spikes short, subumbellate, .25 in. long in fruit, up to .5 in.; corolla-tube long; leaves ovate-lanceolate, acuminate, rounded and then cuneate at base, scabrous above, crenulate, up to 3.5 in. long, 1.5 in. broad, the petiole long and slender.....3. *crenulata*.

Leaves usually ternate, sometimes only opposite, lanceolate, acute, cuneate at base, crenate, hispid-pubescent, up to 4 in. long, 1.5 in. broad; lower bracts of the spike ovate, cuspidate-acuminate; spikes .5—1.5 in. long, elongate in fruit; corolla-tube very white-villous.....4. *trifolia*.

Straggling or climbing shrubs, the stems with many recurved prickles; bracts of the spike lanceolate 3—5-ribbed; spikes short, subumbellate, corolla-tube slender; scabrous-pubescent; leaves ovate or ovate-oblong, acute, cuneate rounded or cordate at base, crenate, rugose and scabrous, up to 4 in. long.....5. *aculeata*.

1. LANTANA INDICA, Roxb.; F. B. I. iv. 562; Wt. Ic. t. 1464.

Deccan, Carnatic and W. Gháts, in hilly country up to 4,000 ft., often planted in gardens.

An erect shrub reaching 3—8 ft. high, the flowers pink or purplish with a yellowish tube.

2. LANTANA WIGHTIANA, Wall. *L. indica*, Roxb., var. *albiflora*, Wt.; F. B. I. iv. 562.

Carnatic and E. slopes of W. Gháts, in or near the hills.

A woody shrub with very pale branches, small leaves and long slender peduncles, the flowers white.

3. LANTANA CRENULATA, Otto & Dietr.; F. B. I. iv. 563.

Coast of the Carnatic, Pulicat (Wight), Madras (Barber), perhaps introduced only.

An erect shrub with yellow and orange flowers, the leaves with long slender petioles, the peduncles up to 3.5 in. long.

4. LANTANA TRIFOLIA, Linn.; F. B. I. iv. 563.

Travancore (Heyne); Bangalore (Cleghorn), an introduced plant.

An erect hispid shrub resembling *L. indica*, the rather large ternate leaves subsessile.

5. LANTANA ACULEATA, Linn. *L. Camara*, Linn.; F. B. I. iv. 562.

W. Deccan and lower hills of W. Gháts, up to perhaps 6,000 ft., especially common in Coorg and Wynaad, introduced from tropical America and run wild. The Lantana. A very aromatic plant with the scent of black currants, the corollas normally orange, but plants found in gardens have them of various hues, from white to dark red. The plant is most troublesome and measures for its destruction are often necessary though difficult (see Troup, 'Sylv. Ind. Trees,' ii, 780).

2. Lippia, Linn.

Shrubs or undershrubs, rarely herbs. *Leaves* opposite or ternate, rarely alternate, often aromatic, entire or toothed. *Flowers* small, in elongate or cylindric or capitate spikes; bracts small, imbricate,

bracteoles 0. *Calyx* small, membranous, 2—4-lobed, ultimately 2-valved. *Corolla* small, salver-shaped, tube cylindric, straight or curved; limb oblique, 2-lipped, the upper lip bifid or emarginate, the lower 3-lobed. *Stamens* 4, didynamous, included at the middle of the corolla-tube; anthers ovate with parallel cells. *Ovary* 2-celled, ovules in each cell solitary; style short; stigma oblique, subcapitate. *Fruit* small, with a dry epicarp enclosed in the calyx valves; mesocarp granular; endocarp hard and bony, separating into 2 1-seeded pyrenes. *Seed* exalbuminous.

Prostrate, widely creeping and rooting, minutely hairy; leaves cuneate-spathulate, serrate towards the apex, up to 2 in. long; spikes dense, globose at first, afterwards elongating, peduncles usually single; bracts broadly obovate, apiculate...1. *nodiflora*. Erect and shrubby, softly white-strigose; leaves ovate, subobtusate, obtuse at base and somewhat decurrent, rugose, crenulate, up to 2 in. long .75—1 in. broad; spikes dense, cylindric, elongating to 1 in. long, peduncles in one or two pairs; bracts ovate, apiculate, white-villous.....2. *geminata*.

1. *LIPPIA NODIFLORA*, Mich.; F. B. I. iv. 563; Wt. Ic. t. 1463.

All Districts, a weed of wet ground and grassy pastures, common.

A prostrate herb with small white flowers.

2. *LIPPIA GEMINATA*, H. B. & K.; F. B. I. iv. 563.

Nilgiris, on Sigūr Ghāt, at 3,000 ft. (Lawson, Gamble); Anamalais (Beddome). Wild Sage.

A strongly aromatic shrub of wet places, the flowers pink.

Lippia citriodora, H.B. & K. is the Lemon-scented Verbena, commonly planted in gardens, especially in the hills, where it sometimes grows to a considerable size. It is a native of S. America, and has very fragrant lanceolate leaves and small lilac flowers in terminal panicles.

3. *BOUCHEA*, Cham.

Herbs or undershrubs. *Leaves* opposite or subopposite, petioled, toothed. *Flowers* sessile or shortly pedicelled in terminal spikes or racemes; bracts small; bracteoles minute or 0. *Calyx* narrowly tubular, prominently 5-ribbed and 5-toothed, at length splitting longitudinally to the base between the 2 longer teeth. *Corolla*-tube slender, cylindric below, gradually widening; limb spreading, oblique, 5-lobed. *Stamens* 4, didynamous, included in the upper part of the tube; anthers oblong, the cells parallel. *Ovary* 2-celled; cells 1—2-ovuled; style slender; stigma oblique, subbilobed. *Fruit* enclosed in the calyx, of 2 elongate 1-seeded pyrenes, each with an interior basal hollow. *Seed* cylindric; testa thin; cotyledons oblong.

BOUCHEA HYDERABADENSIS, Walp.; F. B. I. iv. 564; Wt. Ic. t. 1462.

Deccan and Carnatic, in hilly country from Cuddapah to Tinnevely.

A tall subsrubby plant with pink-purple flowers in long narrow spikes reaching 1 foot or more, ovate-lanceolate leaves deeply serrate in the upper three-fourths, cuneate and entire at the base, up to nearly 6 in. long, 2 in. broad, the hard pyrenes flattened on the inner face.

4. *Stachytarpheta*, Vahl.

Herbs or shrubs. *Leaves* usually opposite, toothed. *Flowers* in terminal spikes in the axils of bracts often closing an excavation of the rhachis in which they lie; bracts usually lanceolate, bracteoles 0. *Calyx* narrowly cylindric, shortly 4—5-lobed, often slit at the back when in fruit. *Corolla* salver-shaped; tube slender, cylindric, usually curved; limb spreading, 5-lobed, the lobes rounded. *Stamens* 2 perfect, included, with 2 or no staminodes; filaments short; anthers with divaricate cells. *Ovary* 2-celled; ovule solitary in each cell, attached laterally near its base; style filiform; stigma capitate. *Fruit* cylindric, enclosed in the calyx-tube, separating into 2 hard 1-seeded usually plano-convex pyrenes. *Seeds* oblong; testa membranous; cotyledons fleshy.

Spikes slender, about 1—15 in. in diam., glabrous, the flowers blue; bracts lanceolate, acuminate, appressed; leaves elliptic-ovate, obtuse or acute, cuneate and decurrent at base, serrate or crenate-dentate except at base, up to 4 in. long, 1.5 in. broad, nearly glabrous.....1. *indica*.
Spikes stout, about 2—25 in. in diam., very villous, the flowers pink; bracts lanceolate, long-acuminate and spreading; leaves ovate, acute, decurrent at base, crenate except at base, up to 5 in. long, 2.5 in. broad, softly tomentose beneath
2. *mutabilis*.

1. *STACHYTARPHETA INDICA*, Vahl; F. B. I. iv. 564. *S. urticæfolia*, Dalz. & Gibs. Bot. Mag. t. 1848.

Hills of the Carnatic, Shevaroy (Perrottet, Bourne), introduced probably.

A tall herb with long slender spikes of blue flowers, the leaves serrate.

- Var. *jamaicensis*, Trimen. *S. jamaicensis*, Vahl; Bot. Mag. t. 1860.

All plains Districts, on roadsides, and in wet places, common and probably only naturalized.

A tall herb with very long slender spikes, the blue flowers in excavations of the rhachis, the leaves coarsely crenate-serrate.

2. *STACHYTARPHETA MUTABILIS*, Vahl.

Hills of the Deccan, Carnatic and W. Gháts, in places, introduced to gardens from tropical America and run wild.

A tall herb, shrubby, with very long stout spikes and pink flowers (scarlet and rose, *Haines*).

5. *Priva*, Adans.

Erect herbs. *Leaves* opposite, thin, toothed. *Flowers* solitary, in simple terminal or axillary spikes or racemes; bracts small, narrow; bracteoles 0. *Calyx* tubular, becoming-inflated in fruit, 5-ribbed, the ribs ending in short teeth. *Corolla*-tube cylindric, straight or curved; limb 5-lobed, spreading, slightly 2-lipped; base of tube with spiral lines. *Stamens* 4 didynamous, included; anther-cells parallel or slightly divergent; staminode minute or 0. *Ovary* 2-celled; ovules 2 in each cell; style long, filiform; stigma oblique, subclavate. *Fruit* enclosed in the loose dilated calyx-tube, separating when ripe into 2 2-seeded pyrenes, usually hollowed out on the inner side. *Seed* smooth; testa thin.

PRIVA LEPTOSTACHYA, Juss. ; F. B. I. iv. 565. *Streptium asperum*, Roxb. Cor. Pl. t. 146.

Deccan and Carnatic, from the Kistna southwards and up to 3,000 ft., W. to E. slopes of the Gháts, on old walls, rocks, etc. An erect herb with quadrangular stem, ovate obtuse long-petioled soft leaves truncate or subcordate at base, 3 in. long, and white flowers in very long racemes covered with hooked hairs, the pyrenes echinate.

6. *Callicarpa*, Linn.

Trees or shrubs, the young branches more or less densely stellately hairy. *Leaves* opposite, rarely ternate, entire or toothed. *Flowers* small, in axillary sessile or pedunculate many-flowered cymes; bracts linear, inconspicuous. *Calyx* small, campanulate, truncate or minutely 4-lobed, not enlarged in fruit. *Corolla* small, campanulate, purple or red; lobes 4; spreading. *Stamens* 4 equal, exserted; anthers oblong, glandular on the back, the cells parallel. *Ovary* imperfectly 2-celled, 2 ovules in each cell; style linear; stigma dilated, obscurely bifid. *Fruit* a small globose drupe, supported by the persistent calyx, containing 4 pyrenes with bony endocarp, each 1-seeded. *Seed* shortly oblong; albumen 0.

Under-surface of leaves with close hard finely stellate pale tomentum; leaves ovate to oblong, acuminate, acute or cuneate at base, entire or slightly denticulate, up to 10 in. long, 6 in. broad, calyx subtruncate.....1. *arborea*.
Under-surface of leaves with dense soft stellate grey or fulvous tomentum; leaves ovate or elliptic, acuminate, truncate or rounded, or cuneate at base, entire or serrate, up to 12 in. long, 8 in. broad; calyx shortly 4-lobed.....2. *lanata*.

1. *CALLICARPA ARBorea*, Roxb. ; F. B. I. iv. 567.

N. Circars, forests of the Eastern Gháts, Ganjam to Godavari, in rather open spots.

A moderate-sized tree with lilac purple flowers and small black drupes. Bark brownish, rough; wood light brownish-white, even-grained. Vern. *Ur*. Boropatri.

2. *CALLICARPA LANATA*, Linn. ; F. B. I. iv. 567. *C. Wallichiana* Walp. ; Wt. Ic. t. 1480.

W. Gháts, in all Districts, at 2,000—4,000 ft., especially at the edges of clearings.

A small tree or large shrub reaching 25 ft. high, the flowers purple, the small drupes black. Bark brown, rough; wood pale brown, smooth, moderately hard, used for carving and the legs of cots. Vern. *Tam*. Vettilai patta; *Mal*. Thin perivelam.

7. *Tectona*, Linn. f.

Trees, stellately tomentose. *Leaves* large, opposite or whorled, entire, petioled. *Flowers* numerous, in dichotomous cymes in large terminal panicles; bracts small, narrow. *Calyx* campanulate, shortly 5-6-lobed, enlarged and bladder-like in fruit. *Corolla* small, white; tube short; limb with 5-6 short subequal spreading imbricate lobes. *Stamens* 5-6, inserted near the base of the corolla, equal, exserted; anthers ovate or oblong with distinct parallel cells. *Ovary* fleshy,

4-celled, each cell 1-ovuled; style linear; stigma shortly bifid. *Fruit* a drupe enclosed in the enlarged calyx; exocarp spongy or nearly dry; endocarp bony thick, 4-celled. *Seeds* erect, oblong; testa membranous; albumen 0; cotyledons fleshy and oily; radicle short.

TECTONA GRANDIS, Linn. f.; F. B. I. iv. 570; Roxb. Cor. Pl. t. 6; Bedd. Fl. t. 250; Brand. For. Fl. t. 44.

N. Circars, forests on both sides of the Godavari; Deccan and Carnatic in Hill forests in all forest Districts, but in scattered localities; W. Ghâts, in all Districts, but most especially in the Wynaad, the Anamalais and in dry forests at low levels in Cochin and Travancore. It has been much planted, the most notable plantation being that of Nilambur in Malabar. *Teak*.

A very large deciduous tree with quadrangular stems, covered, like the inflorescence and under-surface of the leaves, with tawny stellate tomentum. The leaves are very large as are the flower panicles. Bark light brown or grey; wood moderately hard, golden yellow, darkening on exposure, very valuable and in great demand as the principal timber of India, both for local use and for export. Vern. *Hind.* Sagun; *Ur.* Singuru; *Tel.* Teku; *Tam.* and *Mal.* Thekku; *Kan.* Tadi.

8. *Premna*, Linn.

Trees or shrubs, sometimes climbing, rarely herbaceous under-shrubs. *Leaves* opposite or sometimes whorled, entire or toothed. *Flowers* in corymbose paniced or thyrsoid terminal cymes; bracts small, narrow, bracteoles 0. *Calyx* small, campanulate, truncate 2-lipped or shortly 2-5-lobed, somewhat enlarged in fruit. *Corolla* small; tube short, often villous within; limb 2-lipped, 5- or subsequently 4-lobed. *Stamens* 4, didynamous, inserted below the throat of the corolla-tube, rarely exerted; anthers ovate or rounded, the cells parallel or divergent. *Ovary* 2- or 4-celled, 4-ovuled; style linear; stigma shortly bifid. *Fruit* a small drupe, seated on the calyx, globose or obovoid, mesocarp thin, fleshy, endocarp of 1 pyrene, rugose or verrucose, often with a central cavity. *Seeds* oblong, testa thin, albumen 0, cotyledons flat.

Climbing shrubs:—

Leaves coriaceous, glabrous, ovate or ovate-oblong, abruptly cuspidate-acuminate at apex, rounded or cordate at base, entire or shortly serrate, prominently 4-7-nerved, the nerves and reticulations raised beneath, up to 8 in. long, 4 in. broad; corymbs large and spreading, often 8 in. in diam.; calyx truncate, scarcely lipped.....1. *coriacea*.

Leaves membranous:—

Leaves densely softly villous beneath, puberulous above, ovate, acute or shortly acuminate at apex, truncate or cordate at base, entire, 6-8-nerved, the nerves slightly raised beneath, up to 7 in. long, 4.5 in. broad; corymbs up to 4 in. in diam.; calyx truncate or very slightly waved.....2. *villosa*.

Leaves merely villous along the nerves beneath, otherwise glabrous, ovate-oblong, abruptly acuminate, rounded at base, entire, about 3-5-nerved, up to (when young) scarcely 4 in. long; corymbs about 2 in. in diam.....3. *paucinervis*.

Erect trees or shrubs:—

Cymes in panicles:—

Calyx deeply 2-lipped, enlarged and prominent in fruit, the upper lip sometimes minutely 3-lobed; panicles small, under 1 in. broad, dense; leaves

ovate, acuminate, truncate or subcordate at base, nearly glabrous, entire, 4-nerved, up to 4 in. long, 2 in. broad, petiole .5—1 in. long; drupe obovoid

4. *corymbosa*.

Calyx shortly 5-lobed, somewhat enlarged and widened in fruit; panicles pyramidal, up to 4 in. broad; leaves ovate, acuminate, obtuse or cordate at base, densely (like the branches and inflorescence) tawny-yellow stellately tomentose, up to 8 in. long, 5 in. broad, petiole 1—2 in. long; drupe subglobose

5. *tomentosa*.

Cymes in corymbs:—

Corymbs terminal to main branches only, broad; calyx obscurely 2-lipped, one lip 2-lobed, the other 3-lobed or subentire, in fruit saucer-shaped:—

Leaves oblong-elliptic or oblanceolate, abruptly acuminate at apex, somewhat rounded at base, glabrous, entire or slightly serrate, 5—8-nerved, the nerves looped and, with the transverse nervules, prominent beneath, up to 9 in. long, 4.5 in. broad, petiole .6 in.; drupe globose.....6. *glaberrima*.

Leaves ovate, acuminate, rounded at base, pubescent (especially beneath) and gland-dotted, entire or undulate, 6—8-nerved and with subparallel transverse nervules, up to 8 in. long, 4.5 in. broad, petiole 1—4 in.; drupe globose

7. *flavescens*.

Leaves broadly elliptic-ovate, obtuse at apex with a very short point, rounded at base, glabrous or slightly villous beneath, entire or dentate towards the apex, 4—5-nerved, up to 4 in. long, 2.5 in. broad, petiole about .5 in.; drupe globose or obovoid.....8. *serratifolia*.

Corymbs terminal to side branchlets as well as main branches, small; calyx 2-lipped, the upper lip 2-, the lower 3-lobed; leaves ovate, shortly acuminate at apex, obtuse and then cuneate at base, glabrous or pubescent, entire, about 4-nerved, up to 3 in. long, 2 in. broad, petiole .5—1.5 in.; drupe globose

9. *latifolia*.

Corymbs lateral on old wood or sometimes terminal on side branchlets; calyx campanulate but very shallow in fruit; leaves ovate-lanceolate, acuminate, cordate or truncate at base, serrate, up to 3.5 in. long, 1.5 in. broad; drupe obovoid.....10. *procumbens*.

Cymes in thyrsoid panicles, terminal; calyx obscurely 2-lipped, upper lip 2-, lower 3-lobed; leaves ovate, acuminate, obtuse at base, entire or serrate in the upper half, glabrous or slightly pubescent, 4—5-nerved, up to 3.5 in. long, 2 in. broad, petiole slender, .5—1 in. long, grooved; drupe obovoid, verrucose-tubercular

11. *Wightiana*.

Small herbaceous plant from a woody rootstock, the flowers in small corymbs; calyx obscurely 2-lipped, the upper lip 2-, the lower 3-lobed; leaves sessile obovate, coarsely crenate or serrate in the upper half, pubescent on the nerves, up to 4.5 or more in. long, 3 in. broad; drupe globose.....12. *herbacea*.

1. PREMNA CORIACEA, C. B. Clarke; F. B. I. iv. 573.

W. Ghâts, from Mysore and Canara to Cochin and Travancore, at low levels, up to 3,000 ft.

A large climber with pale brown bark with corky lenticels, the corymbs purplish, the flowers white. The petioles have a cup-shaped scar at their base.

2. PREMNA VILLOSA, C. B. Clarke; F. B. I. iv. 573.

Deccan, Sandur Hills of Bellary, at 2,000 ft. (Brougham, Gamble); W. Ghâts, Coorg and Wynaad, at 3,000 ft. (G. Thomson, Beddome).

A large climber with pale brown smooth bark, white flowers and hairy leaves with long petioles.

3. PREMNA PAUCINERVIS, Gamble, *n. comb.* *P. purpurascens*, Thw., var. *paucinervis*, C. B. Clarke; F. B. I. iv. 574.

W. Ghâts, Anamalais at 3,000 ft. (Beddome).

A gigantic climber and epiphyte (Beddome), the flowers supposed to be red. A very little known species.

4. PREMNA CORYMBOSA, Rottl. & Willd.; F. B. I. iv. 573. *P. cordifolia*, Wt. Ic. t. 1483, not of Roxb.
Deccan, forests about Kodúr in Cuddapah; Carnatic, Nellore, Chingleput and Madras to the Javadis, in hedges and among bushes.
A shrub from 3 to 6 ft. high with slender branches and yellowish flowers. Vern. *Tel.* Pomanti, Pedda narva.
5. PREMNA TOMENTOSA, Willd.; F. B. I. iv. 576; Wt. Ic. t. 1468; Bedd. Fl. t. 251.
N. Circars, Deccan and Carnatic down to S. Travancore in deciduous forest, up to about 4,000 ft., common.
A moderate-sized deciduous tree with greenish-yellow flowers. Bark light greyish-brown; wood light brown smooth and close-grained, of good quality but little used. Vern. *Tel.* Nagal, Narvu; *Tam.* Kolakatta; *Kan.* Ije.
6. PREMNA GLABERRIMA, Wt. Ic. t. 1484; F. B. I. iv. 577 (*by error integerrima*).
W. Gháts, hills of Tinnevelly (Wight).
A shrub, 6—8 ft. high, quite glabrous and with characteristic distantly nerved leaves, the branchlets pale brown.
7. PREMNA FLAVESCENS, Ham.; F. B. I. iv. 578.
N. Circars, Rampa Hills of Godavari (V. Narayanswami).
A large tree with large soft leaves and large spreading corymbs of whitish flowers.
8. PREMNA SERRATIFOLIA, Linn. *P. integrifolia*, Linn.; F. B. I. iv. 574; Wt. Ic. t. 1469.
Plains of S. Carnatic, near the coast.
A small tree or shrub with the trunk and older branches with opposite spines, the greenish-yellow flowers unpleasantly scented. Bark thin, pale; wood light brown, scented. Vern. *Tam.* Pay minnay.
9. PREMNA LATIFOLIA, Roxb.; F. B. I. iv. 577; Wt. Ic. t. 869.
N. Circars and Carnatic to Tinnevelly, near the coast, in dry forest areas.
A small tree reaching 25 ft. in height, the leaves usually drying blue or black, the flowers greenish-white. Vern. *Tel.* Pedda nella kura.
Var. *mollissima*, C. B. Clarke. Leaves softly pubescent beneath usually smaller as are the corymbs.
Deccan, in deciduous forest.
Var. *viburnoides*, C. B. Clarke. Leaves ovate, rhomboid at base, glabrate, drying green.
Carnatic, Madras and S. Arcot to Tinnevelly; W. Coast at Cochin.
10. PREMNA PROCUMBENS, Moon; F. B. I. iv. 580.
Tinnevelly, at Mundanthorai, 675 ft. (Fischer).
A small undershrub with yellowish terete branches and flowers in small usually lateral corymbs.
11. PREMNA WIGHTIANA, Schauer, F. B. I. iv. 578. *P. thyrsoides*, Wt. Ic. t. 1485; F. B. I. iv. 579.

W. Gháts, Pulneys and hills of Tinnevely and Travancore, at low levels.

A small tree or large shrub with yellowish-brown branches and white flowers very long-hairy in the throat. Vern. *Tam.* Pinja.

12. *PREMNA HERBACEA*, Roxb.; F. B. I. iv. 581.

N. Circars, forests of Ganjam (Barber), hills of Vizagapatam at 2,500 ft. (A. W. Lushington); W. Gháts, Mudumalai in S. E. Wynaad (Beddome), usually on clay in open ground, especially where fires have been.

A small plant, a few inches high only, with the leaves pressed close to the ground, the flowers small and white.

9. *Gmelina*, Linn.

Trees or shrubs, unarmed or armed with axillary divaricate spines (abortive branchlets). *Leaves* opposite, entire toothed or lobed. *Flowers* large, yellow or brownish-yellow, often tomentose, in dense or lax sessile or pedunculate racemes along the branches of a terminal panicle; bracts usually small, sometimes large and leafy. *Calyx* campanulate, shortly 4—5-lobed or subentire, persistent. *Corolla* obliquely campanulate or funnel-shaped; limb oblique spreading 4—5-lobed. *Stamens* 4, didynamous, inserted below the throat, included; anthers pendulous, with oblong subseparate cells. *Ovary* 4-celled, the cells 1-ovuled; style slender; stigma shortly bifid. *Fruit* a succulent drupe, the endocarp bony, 2—4-celled, usually with a conical hollow in the middle open on one side. *Seeds* oblong; testa thin; albumen 0; cotyledons fleshy.

An unarmed tree; leaves large, deltoid-ovate, acuminate, cordate and then slightly decurrent at base, fulvous-tomentose beneath, up to 9 in. long, 8 in. broad, long-petioled; calyx-lobes 5; corolla brownish-yellow densely pubescent without, tube stout.....1. *arborea*.

Shrub, often spinous from divaricate abortive branchlets; leaves small, ovate, often irregularly lobed, glabrous but glaucescent beneath with minute round glands, up to 1.5 in. long, 1 in. broad, short-petioled; calyx-lobes 4; tube with large glands; corolla bright yellow, pubescent without, tube slender.....2. *asiatica*.

1. *Gmelina ARBOREA*, Roxb. Cor. Pl. t. 246; F. B. I. iv. 581; Wt. Ic. t. 1470; Bedd. Fl. t. 253.

All Districts, in deciduous forests and up to 5,000 ft. in the hills though sporadic and not abundant; often planted in avenues and gardens.

A large or moderate-sized deciduous tree with handsome panicles of brownish-yellow flowers and a large yellow fleshy drupe. Bark smooth, white or whitish-grey; wood greyish-white, glossy, smooth and even grained, useful for planking, furniture and many other purposes and not liable to warp or contract. Vern. *Hind.* Gumhar; *Ur.* Gambari; *Tel.* Gumar tek; *Tam.* Gumadi, Umi; *Kan.* Shivani; *Mal.* Kumbil.

2. *Gmelina ASIATICA*, Linn.; F. B. I. iv. 582; Wt. Ill. t. 174. *G. parvifolia*, Roxb. Cor. Pl. t. 162.

N. Circars, E. Deccan and Carnatic in scrub forest, sometimes planted.

A large straggling shrub, sometimes climbing, spinescent. On poor land, it is often with very small leaves. Bark brownish-

white, thin; wood hard, grey, used for fuel and fencing. Vern. *Tel.* Gumadi; *Tam.* Kumil.

G. Hystrix, Schult., is a thorny shrub, frequently met with in gardens, a native of Tenasserim Siam and Malaya. It has large yellow flowers and conspicuous large coloured bracts.

10. *Clerodendron*, Linn.

Trees and shrubs, sometimes straggling or climbing. *Leaves* opposite, rarely verticillate, simple, entire or toothed or lobed. *Flowers* small or large, in axillary cymes or terminal panicles, often leafy below; bracts conspicuous or small; bracteoles 0 or very small. *Calyx* campanulate, rarely tubular, truncate 5-lobed or almost 5-partite, persistent often accrescent, often coloured in fruit. *Corolla* salver-shaped or funnel-shaped; tube usually long and slender, limb more or less oblique with 5 spreading lobes. *Stamens* 4, didynamous, long-exserted; filaments filiform, involute in bud; anthers ovate or oblong, the cells parallel. *Ovary* imperfectly 4-celled, 1-ovuled; style filiform; stigma shortly bifid. *Fruit* a globose drupe, succulent or rarely dry, 4-grooved, separating into 4 pyrenes of which 1—3 sometimes suppressed; endocarp bony or crustaceous. *Seeds* oblong or pyriform, albumen 0; cotyledons fleshy.

Corolla irregularly salver-shaped, 1·5 in. long or less:—

Panicles axillary, occasionally also terminal; flowers white:—

Calyx minutely toothed, in fruit enlarged, subtruncate, at the base of the spongy drupe:—

Leaves obovate or elliptic, even orbicular, obtuse or emarginate, opposite or rarely ternate, up to 2 in. long, 1·5 in. broad.....1. *inerme*.

Leaves elliptic, acute or acuminate, frequently ternate, up to 3 in. long.....2. *neriifolium*.

Calyx lobed about half-way down, the lobes caudate-acuminate, in fruit enlarged and rigid; leaves ovate-deltoid, sinuate or serrate, up to 3 in. long, and broad, puberulous beneath.....2. *Phlomidis*.

Panicles terminal:—

Calyx subtruncate, the lobes very short; corolla blue to white; 5—1·5 in. long, obovate to lanceolate, often coloured; leaves elliptic or oblong, acuminate, coarsely serrate, up to 12 in. long, 6 in. broad, but usually smaller....3. *serratum*.

Calyx deeply 5-lobed, the lobes lanceolate, acute; corolla pinkish white; bracts small; leaves ovate or almost orbicular, acuminate, cordate or obtuse at base, entire denticulate or serrate, villous or tomentose, up to 10 in. long, 8 in. broad.....4. *infortunatum*.

Calyx small, with subulate lobes; panicle dense, corymbose; corolla white to purple, usually double; leaves ovate, acute, subcordate, up to 6 in. in diam.5. *fragrans*.

Corolla narrowly funnel-shaped, 3 in. or more long; calyx 5 in. long, lobes lanceolate, acute; panicle lax, terminal, much elongate; leaves narrowly lanceolate, subsessile, subentire, up to 9 in. long, 1·5 in. broad.....5. *Siphonanthus*.

1. CLERODENDRON INERME, Gaertn.; F. B. I. iv. 589.

Sea-coasts on both sides, in tidal forests, often planted in gardens, and so perhaps run wild inland.

A straggling shrub, with corolla-tube usually 1—1·5 in. long and a dry brown drupe. Vern. *Hind.* Batraj; *Tel.* Pisung; *Tam.* Pinchil, Sangam.

2. CLERODENDRON PHLOMIDIS, Linn. f. *C. phlomoides*, Willd.; F. B. I. iv. 590; Wt. Ic. t. 1473.

N. Circars, Deccan and Carnatic, usually in hedges and near villages.

A large often rambling shrub with hoary pubescence on the branchlets, the flowers sometimes pink, the corolla-tube .75—1 in. long, the drupe obovoid nearly dry. Bark of the branches nearly white with brown lenticels. Frequently used in medicine. Vern. *Hind.* Urni ; *Tel.* Telaki ; *Tam.* Taludala.

3. *CLERODENDRON SERRATUM*, Spreng. ; F. B. I. iv. 592 ; Wt.-Ic. t. 1472. All Forest Districts, up to 5,000 ft. in the hills, chiefly in rather damp places.

A shrub, usually herbaceous but occasionally woody, with 4-angled stems, pretty blue flowers in a long cylindrical thyrsus and a 4-lobed purple drupe, the corolla-tube short. Often used in medicine. Vern. *Hind.* Barangi ; *Tam.* Chiru dekku.

4. *CLERODENDRON INFORTUNATUM*, Linn. ; F. B. I. iv. 594 ; Wt. Ic. t. 1471.

All Districts, especially the moister ones and up to 6,000 ft. in the hills ; common in forest undergrowth, in mango and other topes and near villages.

A large tawny-villous shrub, occasionally a small tree up to 30 ft. high (Bourdillon) with 4-angled branches and large terminal panicles of pedunculate cymes. In the Southern Districts the leaves are cordate tomentose and entire, proceeding northwards they become less cordate, less tomentose and gradually serrate. It reproduces well by suckers. It is frequently used in medicine. The drupe is black, in an enlarged pink calyx. Vern. *Hind.* Bhánt ; *Ur.* Bania ; *Tel.* Bockada ; *Tam.* Perugilai ; *Mal.* Paragu, Vatta perivelam.

5. *CLERODENDRON SIPHONANTHUS*, R. Br. ; F. B. I. iv. 595 ; Wt. Ill. t. 173.

Deccan and Carnatic, in grass lands and near streams ; W. Coast Districts.

A tall shrub with erect hollow stems up to 6 ft. high or more, conspicuous for its very long-tubed flowers and blue drupes in a persistent red enlarged calyx. Vern. *Hind.* Barangi.

C. nerioifolium, Wall., is a Malay coast shrub, occasionally found in cultivation and run wild. *C. fragrans*, R. Br., is a Chinese shrub with sweet-scented double flowers and bad-smelling leaves, often met with in gardens and run wild in topes and on roadsides. Some other species are also to be found in gardens, the most conspicuous of which is the climbing *C. Thomsonae*, Balf., an African plant with a white calyx and crimson corolla.

11. *Vitex*, Linn.

Trees or shrubs. Leaves opposite, digitately 3—7-foliolate, sometimes 1-foliolate ; leaflets usually entire sometimes dentate. Flowers in sessile or pedunculate cymes forming terminal and axillary or wholly axillary panicles or corymbs ; bracts small, often caducous. Calyx campanulate or tubular-funnel-shaped, truncate or shortly 5-lobed. Corolla small, 2-lipped ; tube usually short ; upper lip of 2, lower of 3 lobes.

the midlobe much the longest. *Stamens* 4, didynamous, usually exerted; anther-cells at first parallel and pendulous afterwards divaricate, always attached at the tip only. *Ovary* 2—4-celled, 4-ovuled; style filiform; stigma bifid. *Fruit* a globose ovoid or obovoid drupe supported by the somewhat enlarged calyx; mesocarp fleshy; endocarp a bony pyrene, normally 4-celled and 4-seeded but often with some cells suppressed, the centre and base sometimes hallowed. *Seeds* ovate or oblong; testa rather thick; albumen 0; cotyledons fleshy.

Inflorescence terminal, with occasional additional branches in upper leaf-axils:—

Shrubs or small trees; leaves membranous, white- or grey-pubescent beneath, entire or sometimes toothed:—

Leaves 1—3-foliolate, the leaflets sessile, obovate-oblong, the middle one cuneate at base, usually subobtusate but sometimes acute at apex; panicles 1—5 in. long; calyx-teeth very short.....1. *trifolia*.

Leaves 3—5-foliolate, the leaflets lanceolate, all with petiolules, the middle one long; panicles up to 12 in. long; calyx-teeth triangular.....2. *Negundo*.

Trees; leaves chartaceous or coriaceous, not grey-pubescent beneath:—

Leaves 3-, occasionally 5-foliolate, the leaflets sessile or subsessile, the side ones lanceolate the middle one lanceolate or oblanceolate, acuminate, all nearly glabrous above, thinly pubescent beneath, up to 6 in. long; petiole angular or winged with an auricled base; panicles with racemose branches of small grey-pubescent cymes, bracts small and caducous; corolla very small, scarcely 2 in. long; drupes small, 2 in. in diam.....3. *altissima*.

Leaves 3-, sometimes 4- or 5-foliolate, the leaflets sessile, ovate or elliptic, abruptly acuminate, rounded at base, broad, glabrate above, fulvous pubescent beneath, up to 9 in. long; petiole not winged; panicles pyramidal, fulvous, with short racemose branches, bracts foliaceous, conspicuous and persistent; corolla 4—5 in. long; drupe shining, about 4 in. in diam.....4. *pubescens*.

Inflorescence axillary:—

Flowers in slender lax panicles of dichasia, often 8 in. long; leaves submembranous, 3-foliolate, the leaflets petioluled, elliptic or lanceolate, acuminate, nearly glabrous, but yellow-gland-dotted beneath, entire or (when young) coarsely serrate, petiole in young trees frequently winged; corolla 3 in. long, puberulous and glandular; drupe obovoid about 3—4 in. long.....5. *peduncularis*.

Flowers in divaricate corymbose dichasia about 4 in. long; leaves coriaceous, 3—5-foliolate, the leaflets long-petioluled, elliptic or lanceolate, obtuse or acuminate, glabrous except along the midrib beneath, entire or sometimes shortly dentate near the tip, petiole not winged; corolla with large lower lip, long-villous on the palate; drupe ellipsoid, 75 in. long, succulent, the pyrene with large basal cavity and usually 1-seeded.....6. *Leucoxydon*.

1. *VITEX TRIFOLIA*, Linn. f.; F. B. I. iv. 583.

Coast Districts, especially the West in S. Canara and Malabar.

A shrub, rarely more, sometimes quite small, the flowers pale purple, the leaves often with only 1 leaflet which may then be ovate or orbicular, up to 2 in. long, 1.5 in. broad. Vern. *Tam. Nir nocchi*; *Tel. Vavili*.

2. *VITEX NEGUNDO*, Linn.; F. B. I. iv. 583; Wt. Ic. t. 519.

All Districts, in the dry region, up to 5,000 ft. in the hills, on waste lands round villages, on roadsides and the banks of streams, common.

A large shrub, rarely a small tree, with bluish-purple flowers and narrow long-acuminate leaflets. Bark thin, grey; wood greyish-white, hard. The plant is used in medicine. Vern. *Hind. Nisinda*, *Shambalu*; *Ur. Beyguna*; *Tel. Vavili*; *Tam., Mal. Nocchi*.

3. *VITEX ALTISSIMA*, Linn. f.; F. B. I. iv. 584; Wt. Ic. t. 1466; Bedd. Fl. t. 252. *V. alata*, Heyne; F. B. I. iv. 584.
All Forest Districts, in deciduous and dry forests of the Deccan and Carnatic, also on W. coast, sometimes but scarce in evergreen forests, up to 4,000 ft. in hilly country. A large and lofty tree with white flowers tinged with blue or violet. Bark yellowish-grey; wood grey to yellowish-brown, hard and close-grained, valuable for building, furniture, carts, etc. The winged petioles are most conspicuous in young plants and coppice shoots. Vern. Tel. Nemili adaga; Tam. Maila; Kan. Myrole; Mal. Mayilai.
4. *VITEX PUBESCENS*, Vahl; F. B. I. iv. 585. *V. arborea*, Roxb.; Wt. Ic. t. 1465.
N. Circars, in deciduous forest, common; Deccan and Carnatic to S. Travancore, less so, up to 3,000 ft. in hilly country, often on the banks of streams.
A large tree with 4-angled branchlets and blue or purple flowers. Bark greyish; wood reddish- or olive-brown, very hard, close-grained, durable and useful for building and other purposes. Vern. Ur. Dhalasingha; Tel. Nowli eragu; Tam. Myladi; Mal. Atta mayila.
5. *VITEX PEDUNCULARIS*, Wall.; F. B. I. iv. 587.
N. Circars in deciduous forest, in the hills up to 3,000 ft., usually near streams, fairly common in Ganjam with Sál. A small or moderate-sized tree, the flowers white with a yellow palate. Bark thick; wood reddish-grey, hard and close-grained.
6. *VITEX LEUCOXYLON*, Linn. f.; F. B. I. iv. 587. *Wallrothia leucoxylon*, Roxb.; Wt. Ic. t. 1467.
All Forest Districts at low levels, on the banks of streams.
A deciduous tree with spreading head and white rather large flowers with purple hairs on the long palate, the drupe large and dark purple. Bark grey, smooth; wood light greyish-brown, moderately hard and useful for furniture and carts. Vern. Tel. Luki; Tam. Nir nocchi; Kan. Sengeni; Mal. Atta nocchi.

12. *Symphorema*, Roxb.

Rambling or climbing shrubs. *Leaves* opposite, entire or toothed. *Flowers* in pedunculate, capitate, usually 7-flowered cymes, with an involucre of 6 oblong or obovate foliaceous bracts accrescent in fruit. *Calyx* obovoid, 4—8-lobed, somewhat accrescent in fruit. *Corolla* with cylindric tube, the limb with 6—16 or more subequal narrowly oblong lobes. *Stamens* as many as the corolla-lobes, exserted; anthers ovate with parallel cells. *Ovary* 2- or imperfectly 4-celled, 4-ovuled, the ovules pendulous. *Fruit* nearly dry, included in the calyx, 1-seeded. *Seed* erect; cotyledons fleshy, concave, enclosing a cavity.

Corolla (tube and lobes) .25 in. long, lobes 6—8; bracts in flower .25—75 in. long, in fruit 1—1.25 in., spatulate, papery, thinly pubescent; leaves ovate or elliptic, subacute, crenate-dentate, stellate-pubescent beneath, up to 6 in. long, 4 in. broad.....1. *involucratum*.
Corolla (tubes and lobes) .5—75 in. long, lobes 12—16 or more; bracts in flower 1 in. long, in fruit 1.5 in., obovate, soft, tomentose; leaves ovate or suborbicular,

acute, crenate-dentate, stellate-tomentose on both surfaces, up to 6 in. long, 4 in. broad.....2. *polyandrum*.

1. SYMPHOREMA INVOLUCRATUM, Roxb. Cor. Pl. t. 186; F. B. I. iv. 599; Wt. Ic. t. 362.

N. Circars, Deccan and E. slopes of W. Gháts.

A deciduous climbing shrub with white flowers.

2. SYMPHOREMA POLYANDRUM, Wt. Ic. t. 363; F. B. I. iv. 599.

Deccan, Nallamalai Hills of Cuddapah and Kurnool (Beddome, Gamble); Kambakam Hill in Chingleput (Hb. Madr.).

A climbing shrub with densely fulvous-tomentose branches and young leaves, the flowers white.

13. *Sphenodesme*, Jack.

Climbing shrubs. *Leaves* opposite, entire, shortly petioled. *Flowers* in capitate 3- or about 7-flowered cymes in an involucre of 6 foliaceous bracts, the cymes in pairs on the branches of large terminal or axillary thyrsoid panicles, leaves at the panicle nodes small and bract-like. *Calyx* ovoid or campanulate, lobes 4—5 short. *Corolla* funnel or slaver-shaped, lobes 4—6, oblong or lanceolate. *Stamens* as many as the corolla-lobes, inserted on the corolla-tube, included or exserted; anthers small, ovate or reniform, the cells parallel or divergent. *Ovary* 2-celled, the cells 2-ovuled, the ovules pendulous from an axile placenta; style filiform; stigma 2-lobed. *Fruit* a globose or obovoid drupe, included in the calyx, 1-seeded. *Seed* globose, included in the calyx; cotyledons fleshy.

SPHENODESME PANICULATA, C. B. Clarke; F. B. I. iv. 600.

W. Gháts, evergreen forests of Cochin and Travancore; Coorg (Rottler); Shevaroy Hill (Perrottet).

A large climber, the branches and inflorescence covered with a golden-brown tomentum, the leaves ovate or elliptic, acute, up to about 5 in. long, 3 in. broad, the main nerves 4—5 pairs. Bracts spatulate, obtuse or emarginate in fruit.

14. *Avicennia*, Linn.

Shrubs or small trees with long creeping roots which give out at intervals narrow conical leafless suckers (pneumatophores). *Leaves* opposite, coriaceous, entire. *Flowers* small, yellow, sessile in capitate peduncled heads of close cymes, sometimes forming terminal trichotomous panicles; bracts small. *Calyx* short, 5-partite; lobes ovate, concave, imbricate. *Corolla*-tube short, cylindric; lobes 4, subequal, or the posterior slightly the larger. *Stamens* 4, adnate to the corolla-throat; filaments short; anther-cells ellipsoid, parallel. *Ovary* imperfectly 4-celled, the central axis 4-winged; ovules 4, pendulous between the axial wings; style tapering; stigma bifid. *Fruit* a compressed capsule, dehiscing by 2 leathery valves. *Seed* solitary, erect; albumen 0; cotyledons large, longitudinally plicate; radicle villous; seed often germinating on the plant.

Leaves obtuse at apex, elliptic-oblong or obovate, attenuate at base, glabrous and shining above, minutely and closely brownish-pubescent beneath, up to 4 in. long, 2 in. broad; anthers exserted; style elongate, tapering; capsule ovoid, 1—1.5 in. long.....1. *officinalis*.

Leaves acute at apex; anthers included; style very short, conical:—

Leaves ovate or lanceolate, cuneate at base, glabrous and shining above, minutely and closely tawny-pubescent beneath, up to 3 in. long, 1·5 in. broad; capsule ovoid, about ·75—1 in. long.....2. *marina*.
Leaves lanceolate, very acute or acuminate, attenuate and decurrent at base, glabrous and shining above, closely whitish-pubescent beneath, up to 4·5 in. long, 1·5 in. broad; capsule when young conical and beaked, when old ovoid, ·75 in. long.....3. *alba*.

1. *AVICENNIA OFFICINALIS*, Linn.; F. B. I. iv. 604. *A. tomentosa*, Jacq.; Wt. Ic. t. 1481.

W. Coast, in S. Canara, Malabar, Cochin and Travancore, along the coast, in creeks and tidal marshes, E. Coast, in the Godavari Delta (Homfray, Foulkes); White Mangrove.

A small tree. Bark greyish-brown, thin; wood brown or grey, hard, of peculiar structure and used only for fuel when other and better kinds are not available. Vern. *Tel. Mada*; *Tam. Upattha*; *Mal. Orei*.

2. *AVICENNIA MARINA*, Vierh. in Denkschr. Akad. Wien, lxxi, 435. *Sceura marina*, Forsk. Fl. Æg.-Ar. Cent. i. 37.

E. Coast, from the Kistna southwards, along the coast in tidal waters and salt swamps.

A large shrub, the wood of similar peculiar structure and used for fuel. Vern. *Tel. Mada*; *Tam. Venkandan*.

3. *AVICENNIA ALBA*, Bl.; Wt. Ic. t. 1482. *A. officinalis*, var. *alba*, C. B. Clarke; F. B. I. iv. 604.

E. Coast, delta of the Kistna river (A. W. Lushington, Foulkes). Tummalapenta in Nellore (Fischer).

A shrub, apparently scarce. Vern. *Tel. Gundu Mada*.

Verbena venosa, Gill and Hook., and *V. bonariensis*, Linn., are S. American plants with purple flowers, cultivated sometimes in gardens and sometimes found run wild, especially in Nilgiris. The garden *Verbenas* of various colours are believed to be hybrids of the S. American *V. chamædrifolia*, Jun.

Duranta Plumieri, Jacq., is a pretty blue-flowered shrub of the W. Indies commonly found in gardens in the plains.

Petrea volubilis, Linn., is a beautiful climbing shrub of tropical America with pendulous racemes of violet flowers in a large purplish persistent calyx, commonly grown in gardens.

Congea tomentosa, Roxb., var. *azurea*, is another beautiful climbing shrub of Burma and Siam, conspicuous by its large pink or lilac bracts.

Holmskioldia sanguinea, Retz, is a straggling shrub of N. India with a large scarlet calyx and corolla often found in Madras Gardens.

Family CXV. LABIATAE.

Herbs or undershrubs rarely shrubs, usually with aromatic oil-glands; branches opposite or verticillate, usually 4-angled. *Leaves* opposite or whorled, simple or rarely pinnatisect; stipules 0. *Flowers* hermaphrodite, more or less zygomorphic, solitary or in pairs or fasciated and axillary, or in centrifugal cymes which by union in pairs

form false whorls; bracts and bracteoles usually small. *Calyx* inferior, persistent, more or less tubular, 4—5-lobed, the lobes often forming 2 lips. *Corolla* hypogynous, tubular at base, the limb 4—5-lobed or 2-lipped, the lobes imbricate in bud. *Stamens* inserted in the corolla-tube, 4 didynamous or only 2 perfect; anther-cells connate separate or confluent, dehiscing longitudinally. *Disk* prominent. *Ovary* deeply 4-lobed; ovules solitary anatropous in each lobe; style simple, from the centre of the ovary between the lobes, slender, 2-fid, sometimes unequally. *Fruit* of 4 dry (rarely fleshy) 1-seeded nutlets, sometimes 1 or more suppressed, scarred at the base. *Seed* small, erect; albumen scanty or 0; radicle inferior.

Ovary 4-partite; nutlets with small scar, basilar or slightly oblique:—

Nutlets dry:—

Stamens 4, all perfect and declinate; anther-cells at length confluent:—

Attachment of nutlets basilar:—

Lower lip of corolla declinate, flat or slightly concave, generally narrower, but hardly longer than the 3—4-lobed upper lip:—

Calyx deflexed in fruit; upper lobe widest, large, ovate, recurved, the margins decurrent on the tube:—

Corolla-tube short; lower lip flat; stigma 2-fid1. *Ocimum*.

Corolla-tube usually long, lower lip concave; stigma entire

2. *Orthosiphon*.

Calyx suberect or declinate in fruit; upper lobe widest, the margins not decurrent on the tube:—

Whorls crowded in globose or ovoid heads; calyx sub-erect

3. *Acrocephalus*.

Whorls racemose or spicate; calyx usually declinate:—

Racemes simple:—

Bracts conspicuous; lower lip of calyx not inflexed

4. *Geniosporum*.

Bracts small; lower lip of calyx inflexed.....5. *Platystoma*.

Racemes paniculate.....6. *Moschosma*.

Lower lip of corolla deflexed, concave boat-shaped or saccate, much longer than the upper lip:—

Upper lip of corolla very short, obtusely 3—4-toothed, lower lip elongate, boat-shaped:—

Calyx equally 5-toothed or somewhat 2-lipped, the upper 3-, the lower 2-toothed, or with upper lip large rounded reflexed, the others narrow, subulate:—

Filaments free.....7. *Plectranthus*.

Filaments connate in a sheath at their bases, round the style

8. *Coleus*.

Calyx very oblique, 2-lipped, the upper lip large entire and nearly or quite closing the mouth, the lower truncate, obscurely 4-toothed; or

calyx 1-lipped, 5-toothed, not quite closing the mouth...9. *Anisochilus*.

Corolla obscurely 2-lipped, the 2 upper lobes flat, the lower lip deflexed, saccate; calyx-teeth subequal.....10. *Hyptis*.

Attachment of nutlets slightly oblique to the outer side; calyx-lobes subequal; corolla 2-lipped; stamens included in the tube.....11. *Lavandula*.

Stamens erect or spreading or ascending:—

Stamens 4 perfect:—

Corolla-lobes 4; stamens equal or subequal:—

Calyx 5-toothed; stamens exerted:—

Corolla-lobes unequal; whorls in glomerate or paniculate or solitary interrupted spikes; filaments bearded or naked.....12. *Pogostemon*.

Corolla-lobes equal; whorls in slender continuous spikes; filaments bearded.13. *Dysophylla*.

Calyx 5-partite, the lobes plumose; filaments naked, included

14. *Colebrookea*.

- Corolla lobes 5, 2-lipped; stamens didynamous:—
 Anterior pair of stamens the longer:—
 Calyx 13-nerved; anthers 2-celled, the cells short:—
 Calyx equally 5-toothed.....15. *Micromeria*.
 Calyx distinctly 2-lipped.....16. *Calamintha*.
 Calyx 5—10-nerved; anthers 2-celled, the cells linear:—
 Upper lip of corolla short, nearly flat; stamens exserted, the cells of
 the upper pair dimidiate, of the lower transverse.....17. *Anisomelea*.
 Upper lip of corolla hooded:—
 Upper lip of corolla not woolly:—
 Calyx 2-lipped with a broad plate or pouch at the back, the
 mouth closed after flowering.....18. *Scutellaria*.
 Calyx tubular, upper lip 3-, lower 2-toothed.....19. *Brunella*.
 Upper lip of corolla densely woolly:—
 Calyx 5-toothed, the teeth spinescent; stamens more or less
 exserted; anther-cells parallel.....20. *Leonurus*.
 Calyx 6—10-toothed; stamens included; anther-cells diver-
 gent:—
 Lower lip of corolla longer than the hood.....21. *Leucas*.
 Lower lip of corolla shorter than the hood.....22. *Leonotis*.
 Posterior pair of stamens the longer; calyx tubular, 15-ribbed,
 5-toothed; stamens not exserted.....*Nepeta*.
 Stamens 2, anterior pair only perfect; anther-cells linear, separated by an
 elongated connective or one cell abortive; calyx 2-lipped:—
 Corolla 4-lobed; anthers 2-celled, the cells pendulous from a long
 connective.....*Meriandra*.
 Corolla 2-lipped, the upper lip entire or emarginate, concave, the lower
 spreading, 3-fid; anther-cells very unequal or solitary, on a long trans-
 verse connective.....23. *Salvia*.
 Nutlets succulent; corolla 2-lipped, the upper lip hooded; anther-cells parallel,
 the anterior pair of stamens the longer.....24. *Gomphostemma*.
 Ovary 4-lobed; nutlets with a large oblique or lateral scar on the inner side;
 stamens 4 perfect, erect, exserted from the fissure of the upper lip:—
 Corolla apparently 1-lipped, the 2 small upper lobes and the lateral pair
 springing from the contracted base of the large lower lobe.....25. *Teucrium*.
 Corolla distinctly 2-lipped, the upper lip short, 2-lobed, notched, the lateral
 pair of lobes very small, springing from the sides of the large lower
 lobe.....26. *Ajuga*.

1. *Ocimum*, Linn.

Herbs, undershrubs or shrubs, strongly aromatic from oil-glands. *Leaves* opposite or whorled, usually toothed, petioled; floral leaves small, bract-like, usually caducous. *Flowers* small, in whorls of 6—10 on the axis of elongate spikes or racemes which are sometimes paniced; pedicels with recurved tips; bracts small, caducous. *Calyx* ovoid or campanulate, deflexed in fruit and then usually enlarged and hardened, 2-lipped; upper lip broad, flat, decurrent, lower lip with 4 mucronate teeth, the 2 middle ones usually the longest. *Corolla* 2-lipped; tube short, not annulate within; upper lip subequally 4-lobed, lower lip hardly longer than the upper, declinate, entire. *Stamens* 4 didynamous, declinate, exserted; filaments free or the lower connate below, the upper often with a tooth or hairy below; anthers 1-celled, later on flattened out. *Disk* entire or 3—4-lobed. Ovary 4-partite; style slender, bifid at apex. *Fruit* of 4 dry, smooth or subrugose, nutlets, often mucilaginous when wetted.

Shrubs; leaves membranous, ovate, acute, cuneate and decurrent at base, coarsely crenate-serrate, nearly glabrous except on the nerves, long-petioled, up to 4 in. long.

2 in. broad; racemes often 6 in. long, the whorls close and about .3 in. apart; upper calyx-lip longer than the lower, rounded and curved upwards in fruit, teeth of the lower short; nutlets large, not mucilaginous when wetted.....1. *gratissimum*.
Herbs or slightly woody undershrubs:—

Racemes elongate, the whorls close; two lower teeth of the calyx longest:—

Fruiting calyx large, hairy or glabrous, the upper lip often .25 in. in diam. and saucer-shaped; racemes long and closely whorled, or shorter and much paniced, the floral leaves conspicuous till they fall; leaves variable, ovate or lanceolate, acute, cuneate at base, entire or denate, usually glabrous, up to 3 in. long, 1.5 in. broad, but usually smaller; nutlets large, pitted, very mucilaginous when wetted.....2. *basilicum*.

Fruiting calyx small, villous and pilose without, the upper lip recurved often to nearly erect, middle teeth of lower lip long and curved:—

Fruiting calyx villous within, the pedicel shorter and erect except at tip; leaves elliptic-lanceolate, entire or slightly serrate, long-petioled, pubescent, up to 1.5 in. long, .5 in. broad; nutlets small, pitted, mucilaginous when wetted.....3. *canum*.

Fruiting calyx glabrous within, the pedicel as long or longer, spreading; leaves elliptic-oblong, obtuse or acute, entire serrate or dentate, pubescent, petioled, up to 2 in. long, 1 in. broad; nutlets small, nearly smooth, not mucilaginous when wetted.....4. *sanctum*.

Racemes lax, the whorls distant, often .5–1 in.; fruiting calyx papery, the upper lip obovate, mucronate, the lower as long, the two lower teeth long, the side ones very short, bimucronate, all nearly glabrous within and without; leaves ovate, obtuse, entire or repand, cuneate at base, up to 1 in. long, .75 in. broad; nutlets orbicular, compressed, mucilaginous when wetted.....5. *adscendens*.

1. *OCIMUM GRATISSIMUM*, Linn.; F. B. I. iv. 608.

Deccan and Carnatic, in low country, cultivated and probably introduced only, chiefly found on waste land and near villages. Shrubby Basil.

A shrub reaching 4–6 ft. in height, much branched, the flowers pale greenish-yellow, the leaves strongly aromatic and used in medicine. Vern. *Hind.* Ram tulsi; *Tel.* Rama tulasi.

2. *OCIMUM BASILICUM*, Linn.; F. B. I. iv. 608.

Carnatic, cultivated. Sweet Basil.

A large herbaceous plant with large leaves and long close racemes of white or pale purple whorled flowers. Vern. *Hind.* Babui tulsi, Kali tulsi.

Var. *thyrsiflorum*, Benth.; Wt. Ic. t. 868.

Deccan, probably cultivated only.

A stout, nearly glabrous, herbaceous plant with the racemes short and collected in terminal thyrsoid panicles, the flowers pink.

Var. *purpurascens*, Benth.

Carnatic, introduced.

A slender herb with nearly single racemes, narrow lanceolate leaves and a generally purple colour.

Var. *pilosum*, Benth.

Deccan and Carnatic, cultivated and run wild.

A slender hispid-pubescent herb with small leaves and narrower racemes, the fruiting calyces much smaller.

3. *OCIMUM CANUM*, Sims.; F. B. I. iv. 607.

Most plains Districts, near villages and on waste lands, probably introduced; also in Nilgiris. Hoary Basil.

An erect much-branched herb, with white, pink or purplish flowers, used in medicine. Vern. *Tel.* Kukka tulasi.

4. *OCIMUM SANCTUM*, Linn.; F. B. I. iv. 609.

All plains Districts, cultivated in pots or on pedestals at all Hindu houses and in temples and frequently found run wild. Sacred Basil.

An erect much-branched softly pubescent undershrub with red or purple small flowers. As the most sacred of plants to Hindus it is carefully looked after, and when large enough to form wood, it is made into beads for rosaries. It is also used medicinally. Vern. *Hind.* Tulsi; *Tam., Tel.* Tulasi.

5. *OCIMUM ADSCENDENS*, Willd.; F. B. I. iv. 609.

N. Circars, Deccan and Carnatic from the Godavari to Tinnevely and S. Travancore, in sandy places and up to 3000 ft. in hilly country.

An annual (?) herb, erect or prostrate with ascending branches, the flowers pale rose, the fruiting calyx yellow and papery.

2. *Orthosiphon*, Benth.

Shrubs, undershrubs or herbs with a woody rootstock, the roots sometimes tuberous. *Leaves* opposite, floral leaves bract-like, usually short and reflexed, sometimes large and coloured. *Flowers* usually in whorls of 6 or less, in terminal racemes. *Calyx* ovoid campanulate or tubular, deflexed in fruit, 5-lobed, the upper lobe broad, membranous, with decurrent margins, the lateral and lower lobes distinct or shortly connate, subulate or aristate. *Corolla* 2-lipped; tube as long as or longer than the calyx, sometimes very long, often slender, straight or incurved; upper lip subequally 4-lobed, lower declinate, entire, concave. *Stamens* 4, didynamous, declinate; filaments free, without appendages at the base; anther-cells confluent. *Disk* usually gibbous. *Ovary* 4-partite; style slender, with a capitate or clavate stigma. *Fruit* of 4 dry ovoid globose or ellipsoid nutlets, usually smooth, the basal scar small.

Stamens included in the corolla-tube:—

Calyx-throat villous within; corolla-tube rather longer than the calyx; leaves ovate or elliptic, obtuse, rounded or cuneate at base, crenate, viscidly tomentose on both surfaces, up to .75 in. long, petiole to .5 in.1. *diffusum*.

Calyx-throat not villous within:—

Corolla-tube about equal to the calyx; leaves ovate, obtuse or acute, cuneate and entire at base, crenate or serrate above, nearly glabrous, glandular, up to 1.5 in. long, 1 in. broad, petiole to .5 in.2. *pallidum*.

Corolla-tube longer than the calyx, in all .25—.75 in. long:—

Leaf-petioles up to 2.5 in. long, leaves broadly ovate, acute obtuse or subcordate or often shortly cuneate at base, coarsely crenate or serrate, nearly glabrous, up to 3.5 in. long, 2 in. broad; corolla .25—.5 in. long, slender, pubescent without.3. *glaberrimum*.

Leaf-petioles only up to .75 in. long, leaves ovate, subobtusate, rounded or cordate at base, crenate, viscidly pubescent and glandular-punctate, up to 3 in. long, 2 in. broad; corolla .5—.7 in. long, puberulous without.4. *viscosum*.

Lower leaves petioled, upper sessile, ovate-oblong, obtuse, long-cuneate at base, nearly glabrous and sometimes glaucous, coarsely serrate-dentate, up to 4.5 in. long, 2 in. broad; corolla .3—.5 in. long.5. *rubicundum*.

Stamens exerted from the long and slender corolla-tube:—

Stamens shorter than the spreading corolla-lobes; corolla-tube 1.25 in. long, villous; fruiting calyx .5 in. long, tubular, hispid and glandular, the upper lip

orbicular, the 4 lower teeth subulate, equal; leaves sessile, oblong or obovate, obtuse, crenulate, up to 2.5 in. long, 1 in. broad, rugose and tomentose, strongly nerved.....6. *comosus*.

Stamens much longer than the corolla-lobes; corolla-tube .5 in. long puberulous; fruiting calyx .3 in. long, campanulate, the upper lip spreading, the 4 lower teeth aristate, the 2 lowest longest and curved; leaves petioled, ovate, acuminate, cuneate at base, coarsely toothed, up to 4 in. long, 2 in. broad, glabrous except on the nerves.....7. *stamineus*.

1. *ORTHOSIPHON DIFFUSUS*, Benth.; F. B. I. iv. 613.

Deccan, hilly country of N. Arcot and Cuddapah, up to 3,000 ft., most usually in rocky places; W. Gháts, N. and E. slopes of Nilgiris and Pulneys in similar localities.

A diffuse undershrub with many branches from a stout woody rootstock, short and with short racemes in very dry places, longer and with more slender racemes and larger leaves (var. *hispidus*, Hook. f.) in better soils.

2. *ORTHOSIPHON PALLIDUS*, Royle; F. B. I. iv. 613.

N. Circars, in Godavari and Kistna; Carnatic, about Madras, in wet places near streams and in rice-fields; Nilgiris to 4,000 ft. (Clarke).

A low diffuse undershrub with many branches from a woody rootstock, the flowers white or pale lilac.

3. *ORTHOSIPHON GLABRATUS*, Benth. *O. tomentosus* var. *glabratus*, Hook. f.; F. B. I. iv. 614.

N. Circars, in Godavari; W. Deccan, in Mysore, Bellary and Salem; hills of the Carnatic and E. slopes of the Gháts to S. Travancore, up to 3,000 ft., chiefly in dry open forests.

An erect herb, reaching about 2 ft. in height, with pale purple flowers of medium size.

Var. *parviflorus*, Benth. Corolla small and narrow, .25 in. long; leaves ovate, coarsely serrate, under 1 in. long, petioles slender, .75 in. W. Gháts, Nilgiris to hills of Tinnevely, scarce.

4. *ORTHOSIPHON VISCOSUS*, Benth. *O. tomentosus* var. *viscosus*, Hook. f.; F. B. I. iv. 614.

Deccan, Nagar Hills of N. Arcot; W. Gháts, in all Districts at low levels, in forest glades.

An erect glandular pubescent herb with, apparently, pale purple flowers, the corolla usually large. Var. *rubiginosus* seems to differ only by being less pubescent and having rather longer petioles to the leaves.

5. *ORTHOSIPHON RUBICUNDUS*, Benth.; F. B. I. iv. 614.

N. Circars, Ganjam to Godavari, in deciduous forest undergrowth, but in somewhat open places; Deccan, in the hills of the Ceded Districts, westwards to Coimbatore; W. Gháts, N. and E. slopes of the Nilgiris up to 6,000 ft.

An erect much branching herb from a stout rootstock, the root often furnished with fusiform root-tubers. The flowers may be white lilac or rose, and the racemes 6 in. long or more, usually with distant whorls of flowers.

Var. *Hohenackeri*, Hook. f. A smaller plant with many branches from a stout rootstock and with smaller leaves and flowers, the calyx-tube very hispid.

Nilgiri Hills, at about 6,000 ft. (Hohenacker, Gamble).

6. *ORTHOSIPHON COMOSUS*, Wt. ex Benth.; F. B. I. iv. 615. *O. bracteatus*, Wt. Ic. t. 1428.

W. Ghâts, hills of Tinnevely and Travancore, about 2,000—3,000 ft.

A striking and handsome shrubby plant conspicuous for the comose tuft of mauve-coloured floral leaves at the ends of the racemes. The upper lip of the corolla has 2 end and 2 side lobes, the lower is oblong. The ellipsoid nutlets are smooth and shining.

7. *ORTHOSIPHON STAMINEUS*, Benth.; F. B. I. iv. 615.

W. Ghâts, Anamalai Hills, at 2,000—3,000 ft.

An erect herb with white or lilac flowers, conspicuous for the very long filiform stamens. The broad upper lip of the corolla is 4-lobed, the lower lip linear-oblong, entire; the floral leaves are small and persistent. The nutlets are ellipsoid, marked with labyrinthiform wavy lines.

3. *Acrocephalus*, Benth.

Herbs. *Leaves* small, opposite or whorled, petioled. *Flowers* very small, in dense whorls collected in terminal or axillary, globose or ovoid, heads with a pair of floral leaves and imbricate bracts. *Calyx* in flower ovoid, in fruit tubular, gibbous at base, 2-lipped, the upper lip flat, entire, the lower entire emarginate or 4-toothed, throat naked. *Corolla* small, somewhat 2-lipped, the upper lip subequally 4-lobed, the lower entire, scarcely longer. *Stamens* 4, didynamous, declinate; filaments free, filiform, not appendiculate at base; anthers 1-celled. *Disk* small. *Ovary* 4-partite; styles slender, shortly bifid at apex. *Fruit* of 4 smooth dry nutlets.

ACROCEPHALUS INDICUS, Briq. *A. capitatus*, Benth.; F. B. I. iv. 611.

N. Circars, forests from Ganjam to Godavari, in damp places;

W. Ghâts and W. Coast in damp grassy places up to 3,000 ft.

An annual erect herb, sometimes quite small, but in places reaching 2 ft. in height, the flowers pale purple, the leaves ovate or lanceolate, acute, cuneate at base to the petiole, serrate, up to 1·5 in. long, ·5 in. broad, the heads ·25—·75 in. long.

4. *Geniosporum*, Wall.

Herbs, erect or procumbent. *Leaves* opposite or whorled, toothed, floral leaves bract-like, often coloured. *Flowers* small, many, in whorls in long terminal lax or stiff spikes or racemes; bracts small, caducous. *Calyx* in flower ovoid, in fruit tubular, the tube constricted above, 10-nerved and often with transverse bars; lobes 5, subbilabiate, the uppermost larger, not decurrent. *Corolla* small, 2-lipped; tube short; upper lip 4-lobed; lower lip entire, declinate. *Stamens* 4, didynamous, declinate; filaments free, often flattened, not appendiculate; anthers

1-celled, later flattened out. *Disk* swollen, gibbous. *Ovary* 4-partite; style slender, bifid at apex, the lobes usually flattened. *Fruit* of 4 dry, ovoid or oblong, smooth or slightly punctate nutlets, not or very slightly mucilaginous when wetted.

Prostrate herbs with many branches from a woody rootstock, glabrous or hispid with soft deflexed hairs; racemes slender, up to 6 in. long with many pedicelled flowers in whorls usually closely packed; fruiting calyx with the uppermost lobe ovate-reniform, mucronate, the rest triangular, the 2 lowest slightly longer, tube .075 in. with a ring of hairs within; floral leaves broadly ovate acuminate, reflexed; leaves ovate or oblong or linear, spatulate, up to 1 in. long, serrate.....1. *prostratum*. Erect herbs, usually unbranched, slightly hispid-pubescent; racemes almost spicate, up to 5 in. long, the whorls closely packed; fruiting calyx ovate, the uppermost lobe large, erect and broadly rounded, the side lobes triangular, the 2 lowest longer and narrow, tube prominently 10-nerved with transverse base, hispid; floral leaves large, reflexed, white and persistent; leaves linear-oblong, up to 2 in. long, scarcely .25 in. broad, distantly serrate.....2. *indicum*.

1. GENIOSPORUM PROSTRATUM, Benth.; F. B. I. iv. 610.

Carnatic, on sandy ground, especially near the sea, common near Madras.

A many-branched herb, very variable in pubescence, also in the shape of the leaves, which, in the prostrate more glabrous forms are small and ovate, in the more erect and hispid ones (*ocimoides*) elongate, up to 1 in. long, .4 in. broad. Flowers red.

Var. *gracile*, Thw. Nearly quite glabrous, the racemes panicle, the leaves very narrow .1 in. broad and up to 1.5 in. long, the side calyx-lobes broader, ovate like the upper one, the 2 lowest small. Coast of the Carnatic.

2. GENIOSPORUM INDICUM, Briq. *G. elongatum*, Benth.; F. B. I. iv. 610.

N. Circars, Jeypore Hills of Vizagapatam (Beddome).

A very slender plant, chiefly found in Ceylon.

5. Platystoma, Beauv.

Small annual herbs. *Leaves* opposite, petioled, serrate. *Flowers* minute, in many-flowered whorls in slender racemes terminal to the stem and branches with a pair of floral leaves at the base; bracts broad, caducous. *Calyx* campanulate, deflexed in fruit, 2-lipped, the upper lip ovate, not decurrent, with a tooth at each side near the base; lower lip ovate, obtuse, slightly concave. *Corolla*-tube very short, widely campanulate at the mouth; upper lip broad, 4-lobed, lower entire, scarcely longer. *Stamens* 4 declinate; filaments free; anthers 1-celled, at length flattened. *Disk* swollen, gibbous. *Ovary* 4-partite; style shortly bifid at apex. *Fruit* of 4 ovoid, smooth nutlets.

PLATYSTOMA FLACCIDUM, Benth.; F. B. I. iv. 611.

Mysore, at Sagar, 2,000 ft. (Meebold).

An erect herb up to 12 in. high with pale lilac flowers, the leaves ovate, acute, narrowed at base into the petiole, serrate, up to 1.5 in. long, .75 in. broad, nearly glabrous.

6. Moschosma, Reichb.

Herbs. *Leaves* opposite, crenate or dentate, petioled. *Flowers* very small, in whorls of 6—10, pedicelled, in slender axillary and terminal

racemes; bracts small. *Calyx* ovoid or campanulate, 2-lipped, the upper lobe or 3 upper lobes larger than the 4 or 2 lower, not decurrent, throat naked. *Corolla* 2-lipped, the upper lip 4-lobed, the lobes subequal or the 2 middle ones rather longer, the lower entire, longer than the upper. *Stamens* 4, didynamous, declinate; filaments filiform, not appendiculate; anther-cells confluent. *Disk* uniform. *Ovary* 4-partite; style 2-fid at tip. *Fruit* of 4 compressed smooth nutlets: basal scar small.

MOSCHOSMA POLYSTACHYUM, Benth.; F. B. 1. iv. 612.

Carnatic, from Nellore southwards to S. Travancore, common, more scarce inland.

A slender erect annual herb with sharply quadrangular stems, pale pink or flesh-coloured very small flowers, ovate deltoid acuminate leaves, entire at the truncate base, crenate above, and very slender racemes about 2 in. long.

7. *Plectranthus*, L'Hér.

Herbs, undershrubs or shrubs, the stems usually more or less 4-angled, sometimes succulent. *Leaves* opposite or ternate. *Flowers* usually small, in paniced or racemed 6—8 flowered cymes or whorls, with pairs of floral leaves; bracts usually small but sometimes large and caducous. *Calyx* usually 2-lipped, enlarged in fruit; lobes 5, subequal or the uppermost widest and sometimes decurrent. *Corolla* 2-lipped; tube exserted, straight or decurved, the throat equal or obliquely swollen, the upper lip short, 4-fid, recurved, the lower entire, boat-shaped, narrow or stipitate at the base. *Stamens* 4, didynamous, declinate; filaments free; anther-cells usually confluent. *Disk* usually enlarged in front. *Ovary* 4-partite; style slender, 2-fid at tip. *Fruit* of 4 orbicular ovoid or oblong nutlets, smooth or punctate.

Fruiting calyx decurved, more or less 2-lipped, the upper lip 3-, the lower 2-lobed, sometimes subequally 5-lobed; slender herbs, never succulent:—

Lips of the fruiting calyx prominent, ribs also prominent:—

Leaves narrowly linear-lanceolate, shallowly serrate in the upper half only, the lower half entire and attenuate to a short petiole, up to 3 in. long, .4 in. broad, nearly or quite glabrous; corolla short, .15 in. long, the lobes short

1. *Walkeri*.

Leaves lanceolate, acute, strongly crenate in the upper two-thirds, the lower part entire, cuneate, the petiole long and slender, blade 2.5 in. long, nearly 1 in. wide, nearly glabrous; corolla short, .15 in. long.....2. *rivularis*.

Leaves ovate, acute, crenate-serrate almost to the base, glandular-pubescent, up to 1.75 in. long, 1 in. broad, petiole short; corolla-tube funnel-shaped, .2 in. long, the lower lip .1 in.; fruiting calyx .2 in. with scattered glands

3. *nigrescens*.

Lips of the fruiting calyx not prominent, ribs prominent, with glands between:—

Fruiting calyx slightly curved, minutely scabrous, the teeth usually acute, .2 in. long; corolla-tube campanulate, the lower lip long, concave; leaves broadly ovate, acute, cordate or rounded at base, crenate or dentate, pubescent or glabrate, up to 5 in. long, 3 in. broad, petioled.....4. *Wightii*.

Fruiting calyx much curved, slightly scabrous, the teeth rounded, .15 in. long; corolla-tube straight, lower lip short; leaves ovate, obtuse, truncate and then slightly cuneate at base, deeply crenate-dentate, membranous and nearly glabrous, up to 1.5 in. long and broad, petioled.....5. *Stocksii*.

Fruiting calyx gibbous at base and slightly curved, densely woolly, the short teeth rounded, .15 in. long; corolla-tube cylindric, lobes hispid-ciliate, short

and spreading; leaves broadly ovate, acute, cordate at base, crenate, thick, rugose and densely tawny-pubescent or tomentose, up to 5 in. long, 3 in. broad, the lower ones petioled, the upper sessile.....6. *nilgherriensis*.
Fruiting calyx subequally 5-lobed, small and curved, declinate; corolla-tube short, curved, upper lip reflexed, 4-lobed, lower entire, concave; leaves ovate, acute, obtuse at base but shortly cuneate and decurrent, crenate, tomentose, white beneath, up to 4 in. long, 2 in. broad.....7. *Coetsa*.

Fruiting calyx 2-lipped, the upper lip entire, the lower 4-lobed; stout plants, often succulent or fleshy:—

Fruiting calyx nearly .5 in. long, the lower lip longer than the small round upper, the teeth incurved and aristate; corolla .3 in. long, the lower lip obtuse; leaves broadly ovate, cordate, deeply and usually doubly crenate, pale, nearly glabrous above, puberulous beneath and villous on the nerves, up to about 6 in. in diam.

8. *incanus*.

Fruiting calyx about .25 in. long, the upper and lower lips nearly equal:—

Inflorescence of elongate panicles of racemes with whorls of about 6 flowers on slender pedicels; corolla very small, about .15 in. long, villous, the lower lip obtuse; leaves broadly ovate or orbicular, cordate, lobulate, the lobules crenate, about 4 in. in diam., flaccid and glabrous; petiole very long.....9. *subincisus*.

Inflorescence paniced, of racemes about 1 in. or more long in elongate thyrsi:—

Corolla .5 in. long, the lower lip elongate, acute, ciliate; leaves broadly ovate or orbicular-ovate, acute, cordate, glandular-pubescent, crenate, up to 4 in. in diam., fleshy; petiole long.....10. *coleoides*.

Corolla .3—.5 in. long, the lower lip acute, glabrous; leaves large, broadly ovate, acuminate, rounded at base, deeply lobulate, the lobules crenate, glabrous, up to 6 in. in diam., petiole very thick, 2—3 in. long

11. *urticifolius*.

Fruiting calyx under .2 in. long; inflorescence paniced, of racemes about 1 in. long or more in elongate thyrsi; more or less fleshy undershrubs:—

Leaves large, broadly ovate, obtuse, cordate or rounded at base, villous on the nerves above, densely tawny tomentose beneath, margins lobulate, the lobules often crenate, up to 10 in. in diam., petioles long; fruiting calyx thick and glandular; corolla elongate, .75 in., the lower lip acute; flowers close, in racemes 1—2 in. long.....12. *fruticosus*.

Leaves rather small, not over 3 in. long, petioled:—

Leaves orbicular, 1—1.5 in. in diam., obtuse, base slightly cuneate and not toothed, upper part crenate, tawny-pubescent; thyrsoid panicles up to 10 in. long, the racemes 1—1.5 in. long, the flowers close; fruiting calyx nearly .2 in. long, tawny villous; corolla .5—.75 in., the lower lip acute

13. *Bourneae*.

Leaves ovate, up to 3 in. long, 2 in. broad, acute, base rounded or slightly cuneate, not toothed, upper part crenate, minutely puberulous; thyrsoid panicles up to 10 in. long, the racemes very slender, single or in pairs on a peduncle, up to 3 in. long, the flowers distant; fruiting calyx scarcely .125 in. long, villous at base; corolla .6 in. long, the lower lip subobtusate

14. *Bishopianus*.

1. *PLECTRANTHUS WALKERI*, Arn.; F. B. I. iv. 617.

W. Ghâts, hills of Tinnevely at 4,000 ft., on the banks of streams.

A herb, decumbent at base, then erect, the flowers pink (Trimen), the narrow leaves very characteristic.

2. *PLECTRANTHUS RIVULARIS*, Wt.; F. B. I. iv. 617.

W. Ghâts, Nilgiris and Anamalais, about 6,000 ft., in wet places; Atrimalai Hills, 3,000—4,000 ft. (Beddome).

A tall herb, with long racemes of many-flowered short cymes in distant whorls.

3. *PLECTRANTHUS NIGRESCENS*, Benth. ; F. B. I. iv. 617.
W. Gháts, hills of Mysore (Talbot, Meebold) ; Shembaganur in Pulneys at 6,000 ft. (L. Anglade).
A slender herb with many-branched slender panicles of white flowers spotted with red, long-pedicelled in dichasioid cymes.
4. *PLECTRANTHUS WIGHTII*, Benth. ; F. B. I. iv. 619 ; Wt. Ill. t. 194 ; Wt. Ic. t. 1429. *P. pulneyensis*, Hook. f. ; F. B. I. iv. 617. *P. nepetaefolius*, Benth. ; F. B. I. iv. 619.
W. Gháts, Nilgiris, Anamalais and Pulneys up to 8,000 ft. and chiefly at higher levels, common ; Shevaroy Hills of Salem.
A tall herb with white flowers speckled with red points and large panicles of prominently small-bracted cymes. The leaves are normally cordate at base, but many Pulney specimens (chiefly *P. pulneyensis*, Hook. f.) have them straight or slightly cuneate. Fyson ('Hill. Flora,' i. 322) seems to be right in considering the three as one variable species. In the form *nepetaefolius* the corollas are usually longer and narrower and the panicles more slender.
5. *PLECTRANTHUS STOCKSI*, Hook. f. ; F. B. I. iv. 618.
Bababudan Hills of Mysore, at 6,000 ft. (Heyne, *fide* 'F. B. I.' Meebold).
A slender annual, decumbent and rooting at base, the stems thin, erect, the corollas white with purple spots.
6. *PLECTRANTHUS NILGHERRICUS*, Benth. ; F. B. I. iv. 619.
W. Gháts, Nilgiris, from Wynaad upwards, 4,000—7,000 ft.
A tall herb, reaching 3 ft. high or more from a large rootstock, the whole plant tawny villous and the large panicles very (especially the calyces) yellowish woolly. The corollas are apparently white with red spots and the whole plant is usually covered with red glands.
7. *PLECTRANTHUS COETSA*, Buch.-Ham. *ex* D. Don ; F. B. I. iv. 619. *P. menthoides*, Benth. ; F. B. I. iv. 620.
W. Gháts, Nilgiris and Pulneys, at 5,000—8,000 ft., edges of Shola Forest ; N. Circars, Mahendragiri Hill in Ganjam, at 4,500 ft. (Gamble).
A tall herb with more or less tomentose leaves white beneath and lavender-blue flowers.
Var. *Macraei*, Hook. f. in Herb. Kew. *P. Macraei*, Benth. ; Wt. Ic. t. 1430. Leaves rounded at base, smaller, especially on the branches, softly tomentose, cymes denser and more closely-flowered, but in many cases running into the type.
W. Gháts, Nilgiris and Pulneys, at 5,000—8,000 ft., in moist places and on the banks of ditches (Wight).
8. *PLECTRANTHUS INCANUS*, Link ; F. B. I. iv. 621.
Deccan, Carnatic and W. Gháts, in hilly country, at about 3,000—6,000 ft.
An erect herb, reaching 2·5 ft. high with pale leaves and fleshy stem and branches, the racemes up to 9 in. long, the flowers pale lilac or light blue, the nutlets spotted.

9. *PLECTRANTHUS SUBINCISUS*, Benth. ; F. B. I. iv. 621.
Hills of Tinnevelly and Travancore, scarce.
A small erect flaccid herb, the racemes reaching 10 in. long, the nutlets pitted.
10. *PLECTRANTHUS COLEOIDES*, Benth. ; F. B. I. iv. 622. *Coleus Wightii*, Benth. ; Wt. Ic. t. 1433.
W. Gháts, Nilgiris, Anamalais and hills of Travancore, at 4,000—7,000 ft., in wet places.
A succulent herbaceous plant reaching 3 ft. in height, the stems purple, the panicles reaching 12 in. long and up to 8 in. in diam., the flowers lilac, the nutlets black and shining. When young the upper parts of the racemes have conspicuous large rounded bracts which are very early deciduous.
11. *PLECTRANTHUS URTICIFOLIUS*, Hook. f. ; F. B. I. iv. 622.
W. Gháts, hills of Tinnevelly, at about 4,500 ft.
A succulent herb with short stem and large panicles, the flowers apparently purple, the nutlets brown and shining.
12. *PLECTRANTHUS FRUTICOSUS*, Hook. f. ; F. B. I. iv. 623.
W. Gháts, Nilgiri and Pulney Hills, about 7,000 ft., banks of lakes and streams.
A large succulent undershrub with thick spongy stem, the flowers mauve, the inflorescence often 12 in. long and very dense. Lady Bourne says that it is planted for hedges in the Pulneys.
13. *PLECTRANTHUS BOURNEAE*, Gamble in Kew Bull., 1924, ined.
W. Gháts, Pulney Hills, about 6,000—7,000 ft., near Kodaikanal, along streams, especially in rocky places (Bourne) ; Coonoor, in Nilgiris 6,500 ft. (Gamble).
A large succulent undershrub with thick stem, the flowers lilac, the leaves whitish or tawny tomentose.
14. *PLECTRANTHUS BISHOPIANUS*, Gamble in Kew Bull., 1924, ined.
W. Gháts, Pulney Hills, near Pillar Rocks, Kodaikanal, about 7,000 ft. (Bourne), drawing in Hb. Kew by Mrs. Bishop.
A large erect slightly fleshy undershrub with lilac flowers, the lower leaves often rather large and more rounded and purplish, the branches of the inflorescence very slender.

8. *Coleus*, Lour.

Herbs or undershrubs, usually aromatic, often fleshy. *Leaves* opposite. *Flowers* in close or lax paniculate or racemose cymes, with pairs of very caducous floral leaves ; bracts also very caducous. *Calyx* 2-lipped, the tube usually decurved, the throat often oblique ; upper lip broad, the lower of 4 usually acuminate lobes. *Corolla* 2-lipped ; tube exserted, decurved ; upper lip short and slightly 4-lobed, recurved ; lower lip long, entire, boat-shaped, narrow or stipitate at base. *Stamens* 4, didynamous, connate below in a sheath around the style ; anther-cells confluent. *Disk* enlarged in front. *Ovary* 4-partite ; style slender, 2-fid at tip. *Fruit* of 4 orbicular or ovoid nutlets, smooth, the basal scar small.

Calyx-throat villous with a ring of white hairs:—

Fruiting calyx with upper lip broad, very obtuse, shorter than the lower; floral leaves ovate, acute; whorls of flowers densely packed; leaves subsessile, glabrous, very fleshy, obovate, obtuse, entire or crenate, up to 2 in. long, 1 in. broad; nutlets black.....1. *spicatus*.
Fruiting calyx with upper lip ovate acuminate, a little longer than the lower; floral leaves broadly ovate, long acuminate; whorls of flowers close at first afterwards up to 1 in. distant; leaves petioled, villous, not fleshy, ovate, obtuse, crenate, up to 5 in. long, 1.5 in. broad; nutlets brown.....2. *barbatus*.

Calyx-throat glabrous within:—

Flowers shortly pedicelled, in dense whorls at distant intervals in a long rather slender raceme; leaves petioled, thick and fleshy, very villous, broadly ovate, crenate, up to 3 in. long, 2 in. broad; calyx hispid, small, the upper lip ovate acute, the lower of 4 acuminate lobes.....3. *amboinicus*.
Flowers in short cymes in pairs or whorls at distant intervals in long racemes often paniculate; leaves long-petioled, membranous, glabrous, ovate, acute cordate rounded or slightly acute at base, up to 7 in. long, 5 in. broad; calyx glabrous, fruiting large, the upper lip rounded and reflexed, the lower of 4 acuminate sharp lobes.....4. *malabaricus*.

1. *COLEUS SPICATUS*, Benth.; F. B. I. iv. 624; Wt. Ic. t. 1431.

Deccan, especially in Salem and Coimbatore, in arid places on rocky ground among bushes.

A perennial fleshy herb with subquadrangular softly hairy stems ascending from a procumbent base and with a strong scent. Flowers pale lilac.

2. *COLEUS BARBATUS*, Benth.; F. B. I. iv. 625; Wt. Ic. t. 1432.

Deccan and Carnatic, in hilly country; W. Gháts, Nilgiris and Pulneys up to 7,000 ft.; often cultivated in gardens.

A perennial aromatic herb with branches from a thick root-stock, very softly-generally white-hairy, the flowers blue.

3. *COLEUS AMBOINICUS*, Lour. *C. aromaticus*, Benth.; F. B. I. iv. 625; Wt. Ill. t. 175.

Circars, Deccan and Carnatic, a Malay species cultivated and found run wild.

A rather large succulent very aromatic herb with small pale purple flowers, said to be known as Indian Borage and used for flavouring drinks and in medicine. Vern. *Hind.* Pathor chur.

4. *COLEUS MALABARICUS*, Benth.; F. B. I. iv. 626.

W. Gháts, Nilgiris, Pulneys and hills of Travancore and Tinnevely up to 6,000 ft.

A large erect herbaceous plant reaching 3 ft., with often purple stems and leaves, the flowers pale lilac with dark blue upper lip.

Coleus parviflorus, Benth., F. B. I. iv. 625, is a species sometimes cultivated in Southern Districts for its edible tubers. *C. Blumei*, Benth., is a beautiful species with the leaves mottled with deep purple or sanguineous stains (see 'Bot. Mag.' t. 4754), which is commonly cultivated in gardens.

9. *Anisochilus*, Wall.

Herbs or undershrubs, often fleshy. Leaves opposite or whorled. Flowers small, in dense tetragonal or cylindrical or slender whorled spikes, the floral leaves and bracts often caducous, red glands often covering especially the corollas. Calyx suberect, inflated below the mid-

dle, 2-lipped or 5-lobed, rarely 1-lipped, the upper lip often entire and much deflexed, the lower short, truncate or minutely lobed. *Corolla* 2-lipped, the tube slender below, inflated above and decurved; upper lip entire or 3—4-lobed, lower elongate, concave. *Stamens* 4, didynamous, declinate, filaments free. *Disk* lobed. *Ovary* 4-partite; style bifid at apex. *Fruit* of 4 ovoid dry nutlets, basal scar small.

Upper lip of fruiting calyx entire, deflexed, concealing the mouth, lower lip truncate obscurely toothed:—

Upper lip large and conspicuous in the spikes; spikes .5 in. in diam., usually 1—2 in. long in fruit:—

Upper lip ovate, acute at apex, .1 in. long, tube swollen and curved, .2 in. long:—

Calyx-tube pubescent without, not silky-villous at the mouth; leaves broadly ovate, obtuse, cordate or rounded at base, deeply crenate, glabrous or villous above, puberulous beneath, up to 3.5 in. long, 2 in. broad, petiole up to 2 in. long.....1. *carnosus*.

Calyx-tube densely white silky-villous at the mouth, glabrous towards the base; leaves thick, orbicular-ovate, obtuse, cordate, shallowly crenate, glandular puberulous, up to 2 in. long, 1.5 in. broad, but usually smaller, petiole under 1 in. long.....2. *eriocephalus*.

Upper lip obtuse and broad glabrous, prominently reticulate, ciliate, tube not much curved, very villous, .2 in. long; leaves thick, ovate, obtuse rounded or attenuate at base, crenulate, densely softly hoary tomentose, up to nearly 2 in. long, 1 in. broad, petiole .5—1 in. long.....3. *scaber*.

Upper lip small and inconspicuous in the spike; spikes .25—5 in. in diam.:—

Upper lip obtuse, ciliate; spikes short, in many-branched trichotomous panicles; leaves thick, ovate or orbicular, obtuse, cordate or rounded at base, crenulate, hoary-tomentose, up to 2.5 in. long, 1.5 in. broad; petiole .5 in. long.....4. *paniculatus*.

Upper lip acute, white-puberulous; spikes long and narrow, 3—6 only in a very long-peduncled panicle; leaves ovate, obtuse, cuneate at base, crenate, hoary-tomentose, up to 2 in. long, 1.5 in. broad, petiole short.....5. *Wightii*.

Upper lip of fruiting calyx short, entire or notched, not concealing the mouth, lower lip truncate:—

Spikes solitary, terminal on the branches:—

Spikes shortly peduncled (1—1.5 in.), very slender, .1—1.5 in. in diam., 2—3 in. long; leaves obovate, obtuse, sessile, slightly crenate, .75 in. long, with 3—4 pairs of very oblique impressed main nerves, collected close under the spikes; corollas much curved.....6. *plantagineus*.

Spikes long-peduncled in fruit:—

Spikes 2—4 in. long, .3—4 in. in diam.; cylindrical, densely white villous on the bracts and calyces; leaves opposite or whorled, sessile, oblanceolate, acute, entire, almost parallel-nerved, densely silvery- or tawny-tomentose, up to .75 in. long, .25 in. broad; corollas very small, short.....7. *argenteus*.

Spikes 3—9 in. long, up to .5 in. in diam., cylindrical, with inconspicuous lanceolate bracts; leaves in whorls, sessile, oblong lanceolate or oblanceolate, acute, entire or crenulate, with 5—6 pairs of oblique main nerves, silky-villous, up to 3 in. long, .5 in. broad; corolla large, the tube much enlarged above, the lips spreading.....8. *verticillatus*.

Spikes short-peduncled, terminal and axillary on the branches of a leafy panicle:—

Spikes 1—3 in. long, .2—3 in. in diam., cylindrical, the bracts inconspicuous; leaves subsessile, opposite, obovate, obtuse, entire or obscurely crenate, fulvous-tomentose, with 3—4 pairs of very oblique main nerves, up to 2 in. long, .5 in. broad; corolla very minute, the lips spreading.....9. *dysophylloides*.

Spikes 1—3 in. long, .1—2 in. in diam., slender, the bracts imbricating; leaves sessile, whorled, oblong or obovate, entire or slightly crenate, densely white- or fulvous-silky tomentose, with 3—4 pairs of nearly parallel main nerves, up to 2 in. long, .6 in. broad; corolla very minute, the upper lip incurved.....10. *sericeus*.

Spikes in terminal long-peduncled racemes on stout branches covered with broad scars; leaves short-petioled, ovate-lanceolate, subacute, entire, tomentose, prominently closely nerved beneath, 1—1.5 in. long, .5 in. broad; corolla-tube long and much deflexed.....11. *suffruticosus*.
 Upper lip of fruiting calyx erect or recurved or deflexed, entire or emarginate, not quite concealing the mouth, lower reflexed, bifid, tube ventricose, very red-glandular; spikes very long and slender in terminal panicles, the flowers in whorls; corolla-tube bent in the middle and broad above, the upper lip incurved, the lower deflexed; leaves petioled, very large, ovate, acute, rounded at base, crenulate, but lower ones sometimes deeply crenate, 12—15-nerved, tomentose beneath, up to 15 in. long, 8 in. broad.....12. *robustus*.

1. *ANISOCHILUS CARNOSUS*, Wall.; F. B. I. iv. 627.
 N. Circars, Deccan and Carnatic, in rocky places on the hills, up to 3,000 ft. or more, less common on W. Coast.
 An erect herb with tetragonous stems, and flowers in long-peduncled spikes, small in flower but large and strobilate in fruit, and covered with red glands. Corolla pale purple, nutlets orbicular, compressed, shining, brown.
2. *ANISOCHILUS ERIOCEPHALUS*, Benth.; F. B. I. iv. 627.
 Deccan, in Cuddapah, N. Arcot and Chittoor, up to 4,000 ft. on Horsleykonda (Gamble), Bellary fort (Wight); Mysore or Canara (Law).
 An erect herb similar to the last but with smaller heads and more slender peduncles.
3. *ANISOCHILUS SCABER*, Benth.; F. B. I. iv. 627.
 W. Ghâts, hills of Tinnevely and Travancore.
 A herb with woody stems, rooting at the nodes, the branches ascending, usually with only single heads, sometimes reaching 3 in. long and purplish when dry, the corolla with long boat-shaped lower lip.
4. *ANISOCHILUS PANICULATUS*, Benth.; F. B. I. iv. 628. Trimen, Fl. Ceyl. t. 75.
 Deccan, in Mysore? (G. Thomson); W. Ghâts, Eachadi Hills in S. Travancore (K. Venkoba Row), in dry forests.
 An erect herb with stout stem and pale nearly white flowers.
5. *ANISOCHILUS WIGHTII*, Hook. f.; F. B. I. iv. 628.
 W. Ghâts, Anamalai Hills (Wight, Barber).
 An erect herb with narrow spikes, a small calyx and much bent, apparently pale, corolla.
6. *ANISOCHILUS PLANTAGINEUS*, Hook. f.; F. B. I. iv. 628.
 Bababudan Hills of Mysore (Law).
 A dwarf undershrub with a very thick rootstock and decumbent stems giving out short erect flower-bearing spikes, the fruiting calyx minute, villous.
7. *ANISOCHILUS ARGENTEUS*, Gamble in Kew Bull. 1924, ined.
 W. Ghâts, Kodaikanal Ghât new road in the Pulneys (Bourne).
 A rather stout undershrub with erect silvery branches and long spikes, the fruiting calyx minute, very tomentose, with rounded upper lip and incurved lower lip.
8. *ANISOCHILUS VERTICILLATUS*, Hook. f.; F. B. I. iv. 629.
 Hyderabad, Golconda Hills (Beddome); Gairsoppa Falls, Mysore, 2,000—3,000 ft. (Meebold).

An erect herb, reaching 3 ft. in height, with deeply grooved stems and pale blue flowers, the fruiting calyx very small, truncate.

9. *ANISOCHILUS DYSOPHYLLOIDES*, Benth.; F. B. I. iv. 628; Wt. Ic. t. 1434. *A. albidus*, Wt. Ic. t. 1436.

W. Ghâts, about Coonoor, 6,000 ft. in Nilgiris.

A thick undershrub with decumbent tomentose stems sending up short erect branchlets bearing spikes of usually white flowers.

- Var. *purpureus*, Gamble. *A. purpureus*, Wt. Ic. t. 1435; Spic. Neilg. t. 195.

Leaves shorter and rather broader, often orbicular, the spikes stouter and more silky, the flowers white streaked with pink.

About Coonoor, on rocks (Wight), Pykara (Bourne).

10. *ANISOCHILUS SERICEUS*, Benth.; F. B. I. iv. 629.

W. Ghâts, Pulney Hills and hills of Tinnevely.

A stout undershrub with long erect stems and slender conspicuously bracteate spikes. It is very near to the last species, but is evidently a much larger plant and the young shoots have dense rather large leaves.

11. *ANISOCHILUS SUFFRUTICOSUS*, Wt. Ic. t. 1437; F. B. I. iv. 628.

W. Ghâts, Nilgiri Hills, at Sispara, on rocky cliffs among grass, about 7,000 ft. (Wight, Gardner).

An erect thick woody undershrub reaching 3 ft. in height, the corollas whitish with pale lilac at the ends of both lips (Wt. Spic. Neilg., t. 196).

12. *ANISOCHILUS ROBUSTUS*, Hook. f.; F. B. I. iv. 629.

W. Ghâts, hills of Tinnevely, apparently about 6,000 ft. (Wight, Beddome, etc.).

A tall stout plant, perhaps shrubby, the stems subtetragonous, the leaves soft and thick, a very distinct species.

10. *Hyptis*, Jacq.

Herbs or shrubs. *Leaves* opposite. *Flowers* small or medium-sized, variously arranged, often capitate. *Calyx* ovoid campanulate or tubular, subequally 5-lobed, often accrescent. *Corolla*-tube cylindric; lobes 5, the lower lobe or lip deflexed and saccate, the others erect and spreading, flat. *Stamens* 4, didynamous, declinate; filaments free; anther-cells confluent. *Disk* entire or glandular. *Ovary* 4-partite; style with a subentire or shortly bifid stigma. *Fruit* of 4 dry ovoid or oblong nutlets, smooth or rugulose; basal scar small.

HYPTIS SUAVEOLENS, Poit.; F. B. I. iv. 630.

Most plains Districts, on roadsides and waste ground, introduced from Tropical America and run wild.

A tall sweet-smelling herb with tetragonal hispid stems, ovate, cordate, denticulate leaves reaching 4·5 in. long and small blue flowers, the fruiting calyx campanulate and ribbed with 5 aristate teeth. Vern. *Hind.* Wilayati tulsi.

11. *Lavandula*, Linn.

Herbs or shrubs, often aromatic. *Leaves* opposite or whorled, entire dentate or pinnatisect. *Flowers* in 2–10-flowered whorls collected in simple or paniced spikes; bracts persistent. *Calyx* erect, tubular, 10–15-ribbed, shortly and equally 5-toothed. *Corolla* oblique, 2-lipped, the upper lip 2-fid, the lower 3-partite, the lobes all spreading. *Stamens* 4, didynamous, declinate, included; filaments free, anther-cells confluent. *Disk* with 4 lobes, opposite the ovary lobes. *Ovary* 4-partite; style 2-fid, the lobes flattened. *Fruit* of 4 dry smooth nutlets, the basal scar somewhat oblique, the back marked by a large white areole.

Leaves petioled, pinnatisect, the lobes broad, oblong; bracts ovate-lanceolate not awned, ribbed; fruiting calyx tubular, 2–3 in. long, villous with long hairs; corolla 2.5 in. long.....1. *Gibsoni*.
Leaves sessile or nearly so, pinnatipartite, the lobes linear; bracts shortly ovate with a long capillary awn; fruiting calyx 2 in. long, hoary-pubescent; corolla up to 5 in. long.....2. *bipinnata*.

1. *LAVANDULA GIBSONI*, Grah.; F. B. I. iv. 631. *L. Lawii*, Wt. Ic. t. 1439.

Nilgiri Hills (Perrottet).

A tall undershrub with flowers in compact woolly spikes.

2. *LAVANDULA BIPINNATA*, O. Kze. *L. Burmanni*, Benth.; F. B. I. iv. 621; Wt. Ic. t. 1438.

Deccan, in Canara, Mysore and Coorg; Ramandrug Hills in Bellary.

A slender erect herb with blue or white flowers in solitary or paniced spikes.

12. *Pogostemon*, Desf.

Herbs, undershrubs or shrubs, often aromatic. *Leaves* opposite, rarely ternate. *Flowers* small, in clusters or racemes in whorls on usually elongate spikes or racemes; the lower whorls often with floral leaves, the upper with bracts and bracteoles, the latter usually very small. *Calyx* more or less tubular, equally 5-lobed, the tube naked within, often enlarged in fruit. *Corolla-tube* included or exerted, 2-lipped, the upper lip 3-lobed, the lower narrower and longer. *Stamens* 4, exerted, subequal; filaments usually bearded; anther-cells confluent. *Disk* subentire. *Ovary* 4-partite; style slender, 2-fid with slender stigmatic lobes. *Fruit* of 4 smooth, ovoid or ellipsoid, dry nutlets, one face often angled.

Spikes or racemes of clusters terminal and axillary, forming a paniced inflorescence:—

Clusters interrupted in the spikes, except sometimes at the top:—

Clusters one-sided in the spikes with a pair of unequal small floral leaves, the rachis usually elongate (even to 1 in. long), secund and curved, with many pairs of obliquely ovate imbricating ciliate bracts, enclosing the flowers and their narrower bracteoles; leaves in unequal pairs, membranous, ovate, acuminate, irregularly inciso-serrate, cuneate at base, appressed-pubescent, up to 5 in. long, 3 in. broad.....1. *paniculatus*.

Clusters not one-sided, globose, small, single or in pairs with small floral leaves, the rachis not elongate, the bracts ovate or lanceolate, ciliate; leaves in usually equal pairs, membranous, glabrescent, ovate, acute or obtuse, simply or doubly crenate-serrate, cuneate at base, up to 4 in. long, 3 in. broad

2. *Heyneanus*.

Clusters close, interrupted towards the base of the not very paniculate spikes but continuous and regular and close above, the floral leaves reflexed; bracts ovate lanceolate, slightly falcate, ciliate, .2 in. long, shorter than the calyx; calyx teeth about equal to the tube; leaves membranous, ovate or ovate-lanceolate, cuneate at base, inciso-serrate, softly hairy, up to about 5 in. long, 2 in. broad

3. *purpurascens*.

Clusters usually close but occasionally interrupted especially in the terminal spikes of the panicle, the floral leaves mostly reflexed; bracts oblong-lanceolate, membranous, ciliate, .2 in. long, usually longer than the calyx; calyx-teeth much shorter than the tube; leaves membranous, ovate, acuminate, cuneate at base, inciso-crenate, softly pubescent, up to 3 in. long, 1.5 in. broad.....4. *Gardneri*. Clusters close and densely packed on the branches of large panicles; leaves chartaceous, long-petioled, often doubly crenate, but scarcely incised:—

Stems and leaves nearly glabrous, also the floral leaves; imbricating short bracts slightly longer than the calyx; calyx-teeth much shorter than the tube; leaves ovate or ovate-lanceolate, acuminate, rounded or slightly cuneate at base, singly or doubly crenate-serrate, up to 3.5 in. long, 1.5 in. broad

5. *pubescens*.

Stems hoary-puberulous, leaves also on the under-surface; floral leaves and imbricating large and prominent bracts softly white- or tawny-pubescent; calyx-teeth much shorter than the rather slender tube; leaves ovate or ovate-lanceolate, acute, rounded or slightly cuneate at base, singly or doubly crenate, up to 6 in. long, 3 in. broad.....6. *plectranthoides*.

Spikes or racemes of clusters terminal or axillary, solitary, not panicked:—

Filaments of the stamens bearded:—

Leaves thin, coarsely crenate or serrate, the petioles long; herbaceous plants with slender branches:—

Leaves ovate, crenate, rounded or slightly cuneate at base, nearly glabrous as are the branchlets, about 2 in. long, 1.5 in. broad, racemes up to 4.5 in. long, .3 in. in breadth, with distant whorls of clusters; fruiting calyx tubular, narrow, villous, deflexed, .1 in. long, the lobes short; bracts and bracteoles minute.....7. *paludosus*.

Leaves ovate, acute, singly or doubly crenate or incised, rounded or broadly cuneate at base, hispid as are the branchlets with long cellular hairs, up to 2 in. long, 1.5 in. broad; racemes up to 6 in. long, .5 in. broad, the whorls of clusters close above, sometimes interrupted below, especially the lowest when the floral leaves are large; fruiting calyx nearly glabrous, inflated, contracted at the much ciliate mouth, sometimes with straggling hairs, .15 in. long, the lobes short; bracts and bracteoles linear.....8. *Wightii*.

Leaves orbicular, obtuse, doubly crenate, rounded or cordate at base, villous with scattered hairs, 2 in. in diam.; racemes up to 4 in. long, .75 in. broad, the whorls of clusters slightly interrupted; fruiting calyx tubular, villous, .25 in. long, the lobes lanceolate; bracts and bracteoles linear-subulate

9. *rotundatus*.

Leaves ovate, subacute, crenate, rounded at base, very long tawny-villous or tomentose with shining hairs, up to 2 in. long, 1.25 in. broad; racemes 3—4 in. long, .5 in. broad, the whorls of clusters close; fruiting calyx tubular, villous like the leaves, the lobes acuminate; bracts lanceolate, bracteoles linear.....10. *nilagiricus*.

Leaves thick and tomentose, shortly crenate, the petioles short; undershrubs, woody at base and with short branches; bracts and bracteoles linear:—

Tomentum on the branchlets, leaves and racemes dark tawny; leaves ovate or orbicular, obtuse, rounded or shortly cuneate at base, crenate, .5—1 in. rarely to 1.5 in. long; racemes up to 7 in. long, .4 in. in diam., the whorls of clusters or short racemules usually crowded; fruiting calyx tubular, villous, .15 in. long, the lobes short.....11. *mollis*.

Tomentum on the leaves and racemes pale tawny to nearly white, the branches with much soft woolly hair; leaves ovate, obtuse, truncate or cordate at base, crenate, rugose and impressed above, up to 1.5 in. long, 1 in. broad; racemes up to 3 in. long, .75 in. in diam., the whorls of racemules rather crowded; fruiting calyx tubular, very tomentose, .25 in. long, the lobes sharp.....12. *vestitus*.

Filaments of the stamens not bearded, but usually slightly villous at base:—

Calyx very densely villous, tubular, .25 in. long, lobes short; corolla-tube slender, exserted; racemes up to 8 in. long, nearly 1 in. in diam., the whorls of racemules very crowded except one or two lower, spreading or reflexed; leaves ovate, acute, cuneate often unequally at base, doubly crenate, dark velvety on both sides, long-petioled, up to 4 in. long, 2 in. broad

13. *atropurpureus*.

Calyx glabrescent or with scattered long strigose hairs, .25 in. long, lobes long-setaceous; corolla-tube slender, not exserted; racemes up to 6 in. long, .75 in. in diam., the whorls of racemules crowded except sometimes in the axils of separate large floral leaves below; leaves broadly ovate, acute, cordate at base, doubly crenate, sparsely hairy, long-petioled, up to 4 in. long, 3 in. broad

14. *speciosus*.

Calyx glabrous, terete, .2 in. long, the lobes triangular; corolla-tube funnel-shaped, exserted; racemes up to 6 in. long, the flowers reflexed on slender pedicels with minute bracts; leaves ovate, acute, rounded or slightly cuneate at base, doubly serrate, nearly glabrous, long-petioled, up to 5 in. long, 2 in. broad.....15. *travancoricus*.

1. *POGOSTEMON PANICULATUS*, Benth.; F. B. I. iv. 631.

W. Coast, from S. Canara to Travancore, up to about 3,000 ft. on the Gháts.

An erect herb reaching 4 ft. in height, the flowers apparently white and small, the clusters sometimes, especially in young flowers, quite small and round, but in older plants much elongate and curved almost to a circle.

2. *POGOSTEMON HEYNEANUS*, Benth.; Wt. Ic. t. 1440. *P. Patchouli*, Hook. f. in F. B. I. iv. 653, *not* of Pelletier.

W. Gháts, S. Canara southwards, in open forest land, often cultivated and then run wild; about Kotagiri in Nilgiris, 6,000 ft. (Wight).

A strongly aromatic herb with small flower clusters. The dried leaves are used to keep off insects.

3. *POGOSTEMON PURPURASCENS*, Dalz.; F. B. I. iv. 632.

W. Coast and W. Gháts, S. Canara, Bahabudan Hills of Mysore (Law).

An erect herb, the stems and branches covered with very soft spreading hairs, the leaves also soft and often in unequal pairs, sometimes tinged with purple, the corollas with purple upper lip and white lower lip.

4. *POGOSTEMON GARDNERI*, Hook. f.; F. B. I. iv. 632.

W. Gháts, Wynaad (Gardner), Sispara in Nilgiris at about 5,000 ft. (Wight), Mankulam in Travancore Hills, 2,500 ft. (Venkoba Row).

A soft branching herb with reddish stems, all parts very villous.

5. *POGOSTEMON PUBESCENS*, Benth. *P. parviflorus*, Benth.; F. B. I. iv. 632 *in part*.

W. Gháts, Nilgiris, Anamalais and hills of Travancore, at about 3,000—5,000 ft.; Kollimalai Hills of Trichinopoly.

A stout erect nearly glabrous herb. The corollas have the upper lip "white, shot with purple, the lower white, the filaments purple with purple hairs (T. Cooke)."

6. *POGOSTEMON PLECTRANTHOIDES*, Desf. ; F. B. I. iv. 632.
N. Circars, Ganjam to Godavari, up to 3,000 ft. on Mahendragiri, in open places in deciduous forests; Deccan, Nallamalai Hills of Kurnool; W. Gháts, S. Canara to Wynaad.
A large erect branching aromatic shrub, with conspicuous flower panicles and long-petioled leaves, the corollas pink or white, the filaments bearded with lilac moniliform hairs. The leaves have the scent of black currants.
7. *POGOSTEMON PALUDOSUS*, Benth. ; F. B. I. iv. 635.
W. Gháts, Nilgiris, in wet places near Ootacamund, 7,000 ft. (Wight), at Sispara, 6,000 ft. (Lawson).
A slender erect herb with nearly black stems, leaves also turning black when dry.
8. *POGOSTEMON WIGHTII*, Benth. ; F. B. I. iv. 635. *P. hirsutus*, Wt. Ic. t. 1442, *not good and not of* Benth.
W. Gháts, Nilgiris, Pulneys and Anamalai Hills, about 7,000 ft., in wet places.
An erect herb about 2 ft. high with reddish branches, the leaves black when dry. Flowers apparently white, with purple tufts of hair on the filaments.
9. *POGOSTEMON ROTUNDATUS*, Benth. ; F. B. I. iv. 636.
Deccan (Heyne), locality not known.
A herb with erect branches from a procumbent base, two branches villous with white cottony hair, the leaves greenish-brown when dry.
10. *POGOSTEMON NILAGIRICUS*, Gamble n. comb. *P. rotundatus*, Wt. Ic. t. 1441, Spic. Nilgh. t. 197, *not of* Benth.
Nilgiris, on the downs at Ootacamund, 7,000 ft. (Bourne),
A soft herbaceous plant with white woolly hair on the stems.
11. *POGOSTEMON MOLLIS*, Benth. ; F. B. I. iv. 635.
W. Gháts, Nilgiri Hills, on the plateau above 6,000 ft., in rough places and the edges of shola forests, Pulney Hills and hills of Tinnevelley; Shevaroy Hills of Salem (Bourne).
A much branched low woody undershrub with white flowers.
12. *POGOSTEMON VESTITUS*, Benth. ; F. B. I. iv. 636.
Deccan (Heyne), locality not known; W. Gháts, Palghat (Wight).
A densely woolly undershrub with ascending branches up to about 18 in. long, the flowers lilac.
13. *POGOSTEMON ATROPURPUREUS*, Benth. ; F. B. I. iv. 636.
W. Gháts, Sispara Ghát in Nilgiris, at 6,000 ft., in moist forest.
An erect shrubby plant with velvety tawny branches having the hair reflexed, the flowers dark purple, the leaves and inflorescence dark rusty black when dry.
14. *POGOSTEMON SPECIOSUS*, Benth. ; F. B. I. iv. 637; Wt. Ic. t. 1443.
W. Gháts, Nilgiris and Anamalais, at 6,000—8,000 ft., on the edges of Shola forest.
A shrub, reaching 3 ft. in height with pilose-hispid brown branches, white flowers tinged with pink and leaves and inflorescence nearly black when dry. The very long stamens give a bottle-brush appearance to the racemes.

15. *POGOSTEMON TRAVANCORICUS*, Bedd. Ic. t. 159; F. B. I. iv. 637.
 W. Ghâts, Atraimalai Ghât, Travancore, at 3,500 ft., Mankulam,
 2,500 ft. (K. Venkoba Rao).
 A subshrubby plant reaching 2 ft. in height, the branches
 smooth, the leaves and inflorescence black when dry.

13. *Dysophylla*, Blume.

Herbs. *Leaves* opposite or whorled. *Flowers* minute, in dense long spikes or racemes of many whorled cymes; bracts and bracteoles many, usually small. *Calyx* ovoid or campanulate, equally 5-lobed, the throat naked within. *Corolla* very small, equally 4-lobed, the tube exserted or included. *Stamens* 4, exserted, straight or subdeclinate; filaments long, bearded; anther-cells confluent. *Disk* equal, subentire. *Ovary* 4-partite; style slender, 2-fid, the stigmatic lobes subulate. *Fruit* of 4 ovoid or oblong, smooth or rough, dry nutlets, the basal scar small.

Leaves opposite:—

Stems and leaves clothed with long soft tawny hair; leaves sessile or shortly petioled, elliptic-oblong or ovate-lanceolate, acute or obtuse, rounded at base, serrate, up to 3 in. long, nearly 1 in. broad; racemes spicate, 2—4 in. long, 3—5 in. broad, the flowers with slender pedicels and lanceolate or spatulate long-ciliate bracts; calyx minute, turbinate; corolla-tube exserted...1. *auricularia*.

Stems and leaves closely pale-tawny or white silky tomentose:—

Spikes very slender, 1·5—4 in. long, about 2 in. broad, the flowers minute with linear bracts; calyx very small, the lobes triangular; corolla-tube included; leaves subsessile, thick, linear-oblong, denticulate in the upper half, up to 1·5 in. long, 3 in. broad.....2. *myosuroides*.
 Spikes about 2 in. long, 25 in. broad, the flowers minute with oblong small bracts; calyx 0·5 in. long, turbinate, gland-dotted, the teeth triangular, ciliate; corolla-tube included; leaves sub-sessile, linear-oblong, obtuse, crenate or subentire, up to 1·25 in. long, 4 in. broad, fulvous-pubescent.....3. *rugosa*.

Leaves in whorls, plants of wet places:—

Erect plants, not floating:—

Racemes single or in leafy panicles, dense, more or less closely grey-pubescent, up to 6 in. long, 3 in. in diam.; leaves linear-oblong or linear-lanceolate, shortly petiolate, serrate, the nerves oblique, up to 4 in. long, 5 in. broad
 4. *quadrifolia*.

Racemes single, very dense, up to about 4 in. long, 4 in. in diam. with a pair of short floral leaves at the base; leaves in distant whorls, linear or narrowly linear-lanceolate usually entire, the margins revolute, strigosely hispid especially beneath, up to 2 in. long.....5. *cruciata*.

Water plants, often floating:—

Stems decumbent at base, glabrous, often geniculate; leaves 4—5 in a whorl, sometimes more, soft and glabrous, linear, usually entire, up to 3 in. long, 2 in. broad; spikes very dense and villous, up to 2·5 in. long, 2 in. in diam., the calyx tube 5-angled, glabrous, with incurved villous lobes.....6. *Griffithii*.

Stems creeping at base, then with many stiff erect branches with very short internodes; leaves many in a whorl, very short, narrowly linear, entire, puberulous, up to 5 in. long, 1 in. broad; spikes very dense and villous, up to 2·5 in. long, 2 in. in diam., the calyx campanulate.....7. *stellata*.

1. *DYSOPHYLLA AURICULARIA*, Blume; F. B. I. iv. 638; Wt. Ic. t. 1445.
 Deccan, hills of Mysore and Bellary; Carnatic, Kollimalai Hills of Trichinopoly; W. Ghâts, Nilgiris and Pulneys at 3,000—6,000 ft.
 An erect annual with pale lilac flowers.

2. *DYSOPHYLLA MYOSUROIDES*, Benth.; F. B. I. iv. 638.
Deccan, Ramandrúg in Sandur Hills, Bellary, at 3,500 ft.; Bababudan Hills of Mysore; Carnatic, base of Kambakam Hill, Chingleput.
A much-branched perennial herb with a woody rootstock, the flowers red; the main nerves of the leaves slender, very oblique.
3. *DYSOPHYLLA RUGOSA*, Hook. f.; F. B. I. iv. 638.
Carnatic, hills near Pallamcottah, Tinnevely (Heyne).
An erect perennial herb similar to the last and perhaps scarcely distinct, the main nerves of the leaves more distant and less oblique.
4. *DYSOPHYLLA QUADRIFOLIA*, Benth.; F. B. I. iv. 639.
N. Circars, hills of Godavari, up to 3,500 ft., in rocky places near streams and in grass savannahs; W. Gháts, and W. Coast, S. Canara and Malabar to the Anamalais.
An erect aromatic undershrub reaching 4 ft. in height with rose-coloured flowers. There are two forms, one with long leaves drying nearly black and subglabrous, the other grey pubescent when dry with the leaves shorter. Vern. Tel. Konda-jajain.
5. *DYSOPHYLLA CRUCIATA*, Benth.; F. B. I. iv. 639. *D. tetraphylla*, Wt. lc. t. 1444.
W. Coast, perhaps Malabar (Wight), in wet places.
A pretty erect herb with lilac or pale purple flowers, easily recognized by the regularly spaced whorls of usually 4 leaves with revolute margins. The stamens are bearded with pink or purple.
6. *DYSOPHYLLA GRIFFITHII*, Hook. f.; F. B. I. iv. 641.
N. Circars, wet places at Bamunpodor in Ganjam (Gamble).
An aquatic herb, rooting in mud or floating in water, the many spikes at the ends of the branches erect, the flowers pink.
7. *DYSOPHYLLA STELLATA*, Benth.; F. B. I. iv. 640.
W. Coast, S. Canara to Travancore, in rice-fields.
A pretty water plant with minute pink flowers and the stamens bearded with purple hairs.
Var. *gracilis*, T. Cooke. *D. gracilis*, Dalz.; F. B. I. iv. 641, taller and with rather more distant whorls or leaves, the stem also thicker with prominent nodal scars.
Canara and Mysore (Law).

14. *Colebrookea*, Smith.

A shrub, densely hoary or woolly. *Leaves* opposite or ternate, petioled, elliptic-oblong or -lanceolate, crenulate. *Flowers* small, functionally dioecious, in bracteate clusters on elongate spikes arranged in panicles. *Calyx*-tube very short; teeth subulate, in fruit elongate, capillary and feathery. *Corolla* small, tube very short, lobes 4, subequal. *Stamens* 4, exserted in ♂ flowers, included in ♀; filaments naked; anthers orbicular, the cells confluent. *Disk* uniform. *Ovary* 4-partite; style bifid, the lobes subulate. *Fruit* of 1—4 obovoid dry nutlets with hairy tips, the basal scar small.

COLEBROOKEA OPPOSITIFOLIA, Sm.; F. B. I. iv. 642. *C. ternifolia*, Roxb. Cor. Pl. t. 245.

N. Circars, common in hilly forests up to 3,500 ft., chiefly in ravines; Deccan, in hill forests in Mysore; W. Gháts, S. Canara to Travancore in dry forest localities.

An erect much-branched very white-tomentose shrub up to 10 ft. high, the flowers white, the fruiting panicles long-plumose, the leaves up to 8 in. long, 3 in. broad, variable in pubescence.

Bark grey, rather corky; wood greyish-white, close-grained.

15. *Micromeria*, Benth.

Herbs or undershrubs. *Leaves* usually small, entire or toothed. *Flowers* small, in axillary few-flowered cymes or in whorls sessile or peduncled on a terminal sometimes paniced raceme; bracts small. *Calyx* 10—13-nerved, 5-lobed or 2-lipped. *Corolla* 2-lipped, the tube straight, annulate within, the upper lip entire or emarginate, the lower spreading, 3-lobed. *Stamens* 4 didynamous, the lower pair the longer, ascending, incurved; anther-cells distinct, parallel, at length divergent, the connective usually thickened. *Disk* cup-shaped. *Ovary* 4-partite; style slender, 2-lobed at apex, the stigmatic lobes equal or the upper short and lower recurved, flattened. *Fruit* of 4 smooth, dry-ovoid or oblong nutlets, the basal scar small.

Stems short, dense, leafy, glabrous or slightly pubescent; leaves very small, ovate, nearly sessile, gland-dotted, 15—25 in. long; cymes, 2—4-flowered, axillary, with slender pedicels.....1. *biflora*.
Stems tall, slender, pubescent; leaves shortly petioled, ovate or oblong, obtuse, serrate, 5—1 in. long, 5 in. broad; whorls dense-flowered, lower ones often peduncled, in long terminal racemes or spikes, tawny-villous.....2. *capitellata*.

1. MICROMERIA BIFLORA, Benth.; F. B. I. iv. 650; Wt. Ic. t. 1446.

N. Circars, hills of Vizagapatam, 3,500 ft. (A. W. Lushington); W. Gháts, Nilgiris and Pulneys above 6,000 ft. common.

An aromatic herb with a very stout rootstock and many tufted ascending wiry stems, the flowers pink.

2. MICROMERIA CAPITELLATA, Benth.; F. B. I. iv. 649.

N. Circars, hills of Ganjam (Barber); W. Gháts, Nilgiri Hills at 5,000—6,000 ft.

A very aromatic herb with long slender stems and small purplish flowers in very dense villous whorls.

16. *Calamintha*, Moench.

Herbs or shrubs. *Leaves* entire or toothed. *Flowers* small, in whorls, the whorls dense and axillary or loose and paniced or spicate; bracts small. *Calyx* ribbed, ribs usually 13, 2-lipped, the upper lip 3-, the lower 2-lobed and with narrower teeth; throat naked or villous. *Corolla* 2-lipped, the tube straight, the throat villous, the upper lip erect, entire or emarginate, the lower spreading, 3-lobed. *Stamens* 4, didynamous, the lower pair longer, ascending under the upper lip; anther-cells distinct, parallel or diverging. *Ovary* 4-celled, style slender, 2-fid, the stigmatic lobes equal or the lower larger. *Fruit* of 4 minute subglobose dry smooth nutlets; basal scar small.

CALAMINTHA UMBROSA, Benth.; F. B. I. iv. 650. *Melissa umbrosa*, Bieb.; Wt. Ic. t. 1447.

W. Gháts, Nilgiri and Pulney Hills, on the downs and in moist woods at high levels.

A slender straggling laxly hairy herb procumbent at base, then ascending, with purplish or sometimes white flowers in axillary whorls, the leaves ovate, serrate, up to 1·5 in. long.

17. Anisomeles, R. Br.

Erect, branching coarse herbs, often very aromatic, the stems usually tetraginous. *Leaves* opposite, the floral leaves sub-similar. *Flowers* in axillary whorls of short spikes usually elongating in fruit, or of lax branching cymes, the whole often paniced; bracts linear, 2 to each flower. *Calyx* ovoid or tubular, straight, equally 5-lobed. *Corolla* 2-lipped, the tube short, annulate within; upper lip short, erect, entire; lower broad, spreading, 3-lobed, the midlobe large, bifid or emarginate. *Stamens* 4, didynamous, exserted, the lower pair longer; anthers of upper pair 2-celled, of lower 1-celled, the cells transverse and parallel. *Disk* equal. *Ovary* 4-partite; style slender, 2-fid, the stigmatic lobes equal, subulate. *Fruit* of 4 smooth dry lenticular nutlets, the basal scar small.

Stem and branches acutely tetraginous; fruiting calyx prominently reticulate; filaments bearded:—

Cymes in the whorls pedunculate, in fruit elongate and unilateral; fruiting calyx scabrous and with scattered bulbous-based hairs, the lobes acuminate; leaves ovate, acuminate, cuneate at base, crenate-serrate, glabrous or sparsely hairy, up to 3 in. long, 1·5 in. broad.....1. *Heyneana*. Cymes in the whorls sessile, shortly elongate in fruit; fruiting calyx hispid, the lobes caudate; leaves ovate, acute or acuminate, rounded or slightly cuneate at base, crenate, tomentose, up to 6 in. long, 3 in. broad.....2. *indica*. Stem and branches obtusely tetraginous and softly white-tomentose as are the under-surfaces of the leaves; cymes in the whorls dense, shortly but sometimes much (up to 2 in.) elongate in fruit; fruiting calyx softly villous with shining hairs, the lobes narrowly lanceolate; leaves thick, lanceolate, acute, rounded at base, crenate-serrate, tomentose, up to 5 in. long, 2 in. broad.....3. *malabarica*.

1. ANISOMELES HEYNEANA, Benth.; F. B. I. iv. 672.

W. Gháts, Nilgiri Hills (Wight), probably from Wynaad. A tall erect herb reaching 5 ft. in height (*Cooke*), the corolla white or greenish-white.

2. ANISOMELES INDICA, O. Kze. *A. ovata*, R. Br.; F. B. I. iv. 672; Wt. Ic. t. 865.

All Districts, except very dry ones, in open forests, on waste land and by roadsides, up to about 5,000 ft., common. An almost shrubby herb reaching 6 ft. in height and smelling strongly of camphor. The corollas have a pale upper lip and purple lower lip and the stems and leaves vary from softly pubescent to velvety tomentose (var. *mollissima*, Benth.) and nearly white beneath. It is used in medicine.

3. ANISOMELES MALABARICA, R. Br.; F. B. I. iv. 673; Wt. Ic. t. 864.

S. Carnatic from Madras southwards to S. Travancore, West to the E. foot of the Gháts, in low country.

An almost shrubby herb reaching 6 ft. in height, densely white woolly and with pale purple flowers. It is used in medicine. Vern. Tel. Moga-bira; Tam. Peyameratti.

18. *Scutellaria*, Linn.

Herbs or undershrubs. *Leaves* opposite; floral leaves usually small and bract-like. *Inflorescence* various, but often in pairs or whorls in a terminal raceme. *Calyx* campanulate, 2-lipped, the lips closed in fruit, the upper lip then deciduous, furnished on the back with a large shield or pouch, the lower lip persistent. *Corolla* 2-lipped, the tube usually sharply recurved above the calyx and then ascending, dilated at the throat, not annulate within; upper lip galeate, entire or notched, lower broad, 3-lobed. *Stamens* 4, didynamous, the lower pair longest; anthers connivent, those of upper pair 2-celled, of lower 1-celled. *Disk* elongate. *Ovary* 4-partite, oblique, on a curved gynophore; style slender, 2-fid, one stigmatic lobe very short. *Nutlets* 4, subglobose, smooth granular or tubercular.

Leaves chiefly radical, with sometimes a few distant pairs on the stem, elliptic, obtuse, rounded or cordate at base, crenate, pubescent, sometimes purple beneath, up to 4 in. long, 2.5 in. or more broad; petioles 1—3 in. long; racemes elongate, solitary or panicled, the floral leaves very small; nutlets minutely tuberculate

1. *discolor*.

Leaves cauline, the floral leaves much smaller and bracteate:—

Erect, stiff plants, pubescent or hispid; leaves ovate, acute, cordate or rounded at base, crenate-serrate, hispid, often purplish beneath, up to 2 in. long, 1—1.5 in. broad, petiole slender, up to about 1 in. long; floral leaves ovate; racemes erect, up to 6 in. long; nutlets granulate.....2. *Wightiana*.

Straggling weak plants, glabrous or minutely pubescent:—

Slender branching flaccid flexuous herbs; leaves ovate, subacute, rounded or cordate at base, membranous, broadly crenate, up to 3.5 in. long, 2.5 in. broad, petiole 1—3 in., floral leaves lanceolate; racemes lax, up to 6 in. long; nutlets spinulose.....3. *violacea*.

Many-branched soft thinly pubescent herbs; leaves deltoid, acute, truncate or cordate at base, rather thick, repand-crenate, minutely tomentose, 1—1.25 in. long and nearly as much broad, petiole .5—7.5 in.; floral leaves very small, ovate; racemes elongate, up to 6 in. long; nutlets minutely tuberculate

4. *Colebrookiana*.

Leaves cauline gradually smaller upwards as they pass into floral leaves, the lower shortly petioled, the upper sessile, ovate or lanceolate, obtuse, cordate or rounded at base, entire or slightly crenate, up to 1 in. long, .5 in. broad; pedicels very short; nutlets granulate.....5. *rivularis*.

1. *SCUTELLARIA DISCOLOR*, Coleb.; F. B. I. iv. 667.

Bababudan Hills of Mysore (Law); Marnhalli, 2,000 ft. (Meebold).

An annual herb, the stems rooting at the base, the flowers with pale blue corolla about .5 in. long, the pouch of the upper fruiting calyx-lip short and broad.

2. *SCUTELLARIA WIGHTIANA*, Benth. *S. violacea*, Heyne, var. *hispidior*, Benth.; F. B. I. iv. 668; Wt. Ic. t. 1449.

W. Gháts, Nilgiri Hills, at about 5,000—7,000 ft.

A stiff-branched but erect herb, the stems rooting at base, the corollas white or rose (Wight), .5 in. long, the pouch of the upper fruiting calyx-lip deep and hooded.

3. *SCUTELLARIA VIOLACEA*, Heyne; F. B. I. iv. 668 in part; Bot. Mag. t. 8320.

N. Circars, hills of Vizagapatam at 2,500 ft. (Beddome, A. W. Lushington), Rampa Hills of Godavari, at 4,000 ft. (V. Narayanswami); W. Gháts, Nilgiris, Pulneys and hills of Travancore, up to 7,000 ft.

A flaccid straggling herb, the pouch of the upper fruiting calyx-lip concave without, the corolla-tube long, blue with white patches on the lip.

4. SCUTELLARIA COLEBROOKIANA, Benth. *S. violacea* var. *Colebrookiana*, Hook. f.; F. B. I. iv. 668.

W. Gháts, Pulney Hills and hills of Tinnevely, apparently at low levels.

A straggling herb of characteristic aspect and soft thick deltoid leaves, the pouch of the upper fruiting calyx-lip usually concave without, the corolla large, especially the broad lower lip.

5. SCUTELLARIA RIVULARIS, Benth.; F. B. I. iv. 670; Wt. Ic. t. 1450.

W. Gháts, Nilgiris, in wet places near streams at about 7,000 ft., Pykara (Wight), Cairn Hill Swamp (Gamble).

A nearly glabrous tufted herb with many branches, the lower one rooting below, the corolla lilac or blue and short, the pouch of the upper lip of the fruiting calyx broad and curved forward.

19. *Brunella*, Linn.

Perennial herbs. *Leaves* opposite; floral leaves bract-like. *Flowers* in whorls of 6, closely packed in terminal cylindric heads. *Calyx* reticulate, white-strigose, 2-lipped, above a short tube closed in fruit; upper lip broad, 3-toothed, lower 2-lobed, the lobes lanceolate, aristate. *Corolla* ascending, tube annulate at the base within; upper lip erect, galeate; lower lip spreading, the side lobes oblong deflexed, the middle lobe rounded, concave, crenulate. *Stamens* 4, didynamous, exserted; filaments bifid, especially the upper, at apex, the lower arm anther-bearing; anthers conniving, 2-celled, the cells divaricate. *Disk* erect. *Ovary* 4-partite, on a gynophore; style slender, 2-lobed, the stigmatic lobes subulate. *Fruit* of 4 smooth oblong nutlets.

BRUNELLA VULGARIS, Linn.: F. B. I. iv. 670. Var. *hispida*, Benth.; Wt. Ic. t. 1448.

W. Gháts, Nilgiris, Pulneys and hills of Travancore, above 5,000 ft., in grass, on the downs.

A herb with creeping rootstock, the stems and ovate obtuse leaves hispidly hairy, the corollas deep purple-blue or sometimes white, the bracts broadly ovate-cordate, apiculate, often purple on the margins.

20. *Leonurus*, Linn.

Erect stout herbs. *Leaves* opposite, lobed, floral leaves similar. *Flowers* in dense axillary whorls; bracts subulate. *Calyx*-tube turbinate, 5-nerved; teeth 5, spreading, spinescent. *Corolla* 2-lipped; tube cylindric, annulate within; upper lip erect, entire, lower 3-lobed, the midlobe obcordate. *Stamens* 4, didynamous, the lower pair the

longest; anthers conniving, the cells transverse. *Disk* uniform. *Ovary* 4-partite; style 2-fid, the stigmatic lobes obtuse or subulate. *Fruit* of 4—3-quetrous truncate, smooth nutlets, the basal scar small.

LEONURUS SIBIRICUS, Linn.; F. B. I. iv. 678.

Coorg, Nilgiri Hills and other localities, in waste places.

An annual weed with 4-gonous stems and long-petioled pinnatifid leaves having linear-lanceolate segments. The flowers are red.

21. *Leuca*, R. Br.

Herbs, undershrubs or shrubs, nearly always pubescent or villous; branches usually 4-gonous. *Leaves* opposite or whorled; floral leaves usually similar. *Flowers* usually white, in axillary few- or many-flowered whorls, rarely quite terminal; bracts usually many, linear or lanceolate, frequently enclosing the base of the whorls. *Calyx* tubular, 10-ribbed, the mouth straight or oblique, equally or unequally 6—10-toothed, often with a ring of hairs within the teeth, fruiting calyx often elongated. *Corolla* 2-lipped; tube included, annulate or naked within; upper lip erect concave externally, often densely and white- or tawny-villous, lower lip spreading, 3-lobed, the midlobe very large. *Stamens* 4, didynamous, the lower pair the longer; filaments ascending under the upper lip; anthers connivent, the cells divaricate, at length confluent. *Disk* entire or lobed, equal or glandular in front. *Ovary* 4-partite; style subulate at the apex, the upper lobe obsolete. *Fruit* of 4 ovoid triquetrous obtuse dry nutlets, the basal scar small.

Mouth of the calyx oblique:—

Longer side of the calyx-mouth anterior, tube prominently ribbed, reticulate and curved; bracts linear-lanceolate, ciliate; corolla-tube slender, .2 in. long, the upper lip .05, the lower .1 in.; whorls up to 1 in. in diam. in most axils; leaves thin, ovate, acute, rounded or slightly cuneate at base, more or less pubescent, coarsely crenate-serrate, up to 2.5 in. long, 1.5 in. broad, petiole to 1 in.

1. *urticaefolia*.

Longer side of the calyx-mouth posterior:—

Calyx-tube bent in the middle to curve outwards or downwards, the teeth long and slender:—

Calyx-tube sigmoidly curved, pubescent, ribbed and reticulate, the uppermost tooth nearly twice as long as the rest; bracts linear-lanceolate, villous, spinous-awned; corolla-lips nearly equal, short; whorls in most axils about 1 in. in diam.; leaves ovate or lanceolate, acuminate, cuneate at base, coarsely crenate-serrate, pubescent, up to 3.5 in. long, 1.5 in. broad, petiole to .75 in. 2. *martinicensis*.

Calyx-tube abruptly deflexed, villous, strongly ribbed, the teeth subequal; bracts thin, foliaceous, lanceolate, ciliate, .2—3 in. long; corolla with lower lip longer than upper; whorls in upper axils about .75 in. in diam.; leaves oblong-lanceolate, obtuse, shallowly serrate, hispid, up to 2 in. long, .5 in. broad, petiole very short. 3. *nutans*.

Calyx-tube erect, not bent in the middle:—

Mouth of the calyx-tube very oblique, the upper tooth long, the rest smaller:—

Bracts linear, finely pubescent, .2—3 in. long, not long-ciliate; calyx-tube with upper and lower halves similar, glabrous or short-pubescent, .25 in. long; corolla with lower lip long and broad; whorls terminal and few at the ends of the branches, .5—1 in. broad; leaves linear or narrowly linear-lanceolate, obtuse, entire or slightly serrate, pubescent, up to 3.5 in. long, .4 in. broad, petiole very short. 4. *linifolia*.

Bracts linear, villous and long-ciliate:—

Calyx-tube uniform:—

Calyx prominently nerved and hispid, .25 in. long, the teeth all sharp; corolla very small, the upper and lower lips nearly equal; whorls close together in the uppermost axils, scarcely .5 in. in diam.; leaves sessile, linear, obtuse, entire or very distantly obscurely serrate, up to 2.5 in. long, .25 in. broad.....5. *Wightiana*.

Calyx not prominently nerved, hispid, .25 in. long, the teeth small; corolla large, the lower lip much longer than the upper, the midlobe broad; whorls terminal with one or more in adjacent axils as well, .5—75 in. in diam., leaves subsessile, linear or linear-lanceolate, entire or distantly obscurely serrate, up to 4 in. long, .75 in. broad

6. *zeylanica*.

Calyx-tube glabrous and membranous in the lower half, ribbed and hispid and with long bulbous-based hairs in the upper; corolla large, the lower lip twice as long as the upper, the midlobe obovate; whorls terminal and also sometimes in upper axils, dense, up to 1 in. in diam.; leaves linear- or oblong-lanceolate, obtuse, entire or crenate, pubescent, up to 3 in. long, .5 in. broad, petiole short.....7. *aspera*.

Mouth of the calyx-tube slightly oblique, the teeth subequal:—

Whorls very large, terminal, globose, 1—2 in. in diam.; bracts foliaceous, imbricate, lanceolate, green, membranous, ciliate, .5—75 in. long; calyx tubular, .75 in. long, glabrous below, villous above; leaves ovate or ovate-lanceolate, obtuse, membranous, crenate, pubescent, up to 4 in. long, 1.5 in. broad, petiole to .5 in.....8. *Cephalotes*.

Whorls small, under 1 in. in diam., mostly terminal; bracts stiff, linear, hispid and with few but prominent long bulbous-based bristles as on the calyx-tube:—

Calyx-teeth about .1 in. long or longer, subulate, the tube white-villous, ribbed and bristly near the mouth, often nearly glabrous below; leaves variable, linear or oblong, obtuse, hispid, up to 2 in. long, .5 or sometimes .75 in. broad, petiole very short.....9. *stricta*.

Calyx-teeth about .025 in. long, triangular, the tube curved, ribbed, hispid and bristly; leaves linear or linear-oblong, obtuse, up to 1.5 in. long, .3 in. broad, sessile.....10. *diffusa*.

Mouth of the calyx straight:—

Calyx-teeth erect, rarely spreading, throat naked; whorls axillary:—

Whorls few-flowered, usually about 1—4 at any rate on each side; bracts setaceous:—

Calyx-teeth very short, .05 in. long, triangular, tube obconical, ribbed, .3 in. long, villous; leaves orbicular-ovate, obtuse, coarsely crenate, pubescent, 1 in. long, petiole to .5 in., slender.....11. *nepetaefolia*.

Calyx-teeth subulate, .1 in. long, ciliate, tube campanulate, ribbed, .2—25 in. long, villous, leaves variable, ovate or elliptic, obtuse or acute, rounded or cuneate at base, crenate-serrate, rarely over 1 in. long, .5 in. broad, the petiole short.....12. *biflora*.

Whorls about 6- many-flowered, fewer on the branches than on main stems:—

Hairs on the branches erect or spreading, not deflexed, whole plant densely white-silky tomentose except the upper surface of the mature leaves usually softly villous only; calyx-teeth very short, about .05 in., the tube .25—35 in.; leaves subsessile, thick, ovate or suborbicular, rounded at base, crenate-serrate, up to 2.5 in. long, 1.5 in. broad.....13. *lanata*.

Hairs on the branches deflexed:—

Calyx-teeth short, under .1 in. long; bracts minute, linear.

Calyx-teeth subulate, about .05 in. long, the tube campanulate, ribbed, softly white villous, slightly curved, .25—35 in. long:—

Leaves thick, ovate, obtuse, rounded at base, crenate, nearly glabrous above, densely white velvety tomentose beneath, up to 1.5 in. long, 1 in. broad, petiole very short.....14. *montana*.

Leaves rather thin, ovate or ovate-lanceolate, acute, cuneate at base, serrate, somewhat strigosely villous above, hoary-tomentose beneath, up to 4 in. long, 2 in. broad, petiole sometimes to nearly 1 in.

15. *mollissima*.

Calyx-teeth triangular, spreading, the tip spinulose, the tube funnel-shaped, ribbed, densely softly white-silky with a few long hairs, .3—.5 in. long; leaves broadly ovate, acute or obtuse, cuneate at base, crenate or dentate, softly pubescent or tomentose, up to 2.5 in. long, 1.5 in. broad, petiole slender, .25—1.25 in.16. *chinensis*.

Calyx-teeth usually over .1 in. long, but unequal, so some shorter, all slender and subulate:—

Bracts subulate, .25 in. long, shortly hispid; calyx-tube cylindric, hispid on the ribs, the teeth unequal, up to .15 in. long; leaves triangular-ovate or lanceolate, thin, acute, truncate rounded or almost cordate at base, coarsely crenate or serrate, pubescent, up to 3 in. long, 1.5 in. broad

17. *angularis*.

Bracts narrowly lanceolate or spatulate, acuminate, .4 in. long, long-ciliate; calyx-tube campanulate, hispid on the ribs, the teeth subequal, up to .1 in. long; leaves ovate or orbicular, thin, usually obtuse, truncate at base, coarsely crenate, pubescent, 1—1.5 in. in diam., petiole to .5 in.

18. *pubescens*.

Bracts filiform with long soft silky hairs, .5 in. long; calyx tubular, softly silky, the teeth unequal, up to .15 in. long, filiform; leaves thick, often tawny and rugose or bullate beneath when old, thinner and white-tomentose when younger, rounded or cordate at base, crenate, up to 2 in. long, 1.5 in. broad, petiole slender, .25—.5 in. long.19. *marruboides*.

Calyx-teeth erect and usually stellately spreading, throat villous; whorls chiefly terminal, but sometimes also in upper axils:—

Leaves quite entire:—

Leaves at most 1—1.5 in. long, narrow, obtuse, coriaceous, with revolute margins:—

Branches fulvous, calyx fulvous- or white-tomentose:—

Leaves linear, .5—1 in. long, .1—2 in. broad, white-tomentose beneath:—

Stems and leaves scaly and hispid with erect or spreading hairs; whorls 1—2 at the top of scapiform branches 6—10 in. long; bracts setaceous, villous, .125 in. long; calyx-teeth minute, about .025 in. long, the throat ring of hairs as long.20. *suffruticosa*.

Stems and leaves closely appressed-villous; whorls usually 2 at the ends of slender subterminal internodes 1—2 in. long; bracts subulate, .1 in. long; calyx-teeth minute, .025 in. long, the throat ring of hairs as long.21. *ternifolia*.

Leaves linear-oblong, 1—2 in. long, .2—4 in. broad, white or tawny beneath; above fulvous-villous like the stems, with erect hairs; whorls many, crowded at the ends of the branches; bracts subulate, .25 in. long; calyx-teeth minute, .025 in. long, the throat ring of hairs long and dense.22. *helianthemifolia*.

Branches greenish-grey, strigose with erect hairs; leaves linear, obtuse, 1—2 in. long, .1—1.5 in. broad, grey-villous beneath; whorls usually single, terminal or axillary on short peduncles; bracts linear-oblong, strigose, .2—3 in. long; calyx-teeth triangular, .04 in. long, shorter than the prominent throat ring of hairs.23. *rosmarinifolia*.

Leaves up to 4 in. long, 1 in. broad, soft, chartaceous, lanceolate, scaberulous above, white-tomentose beneath, the margins very slightly revolute; whorls about 1 in. in diam., axillary to the 3—5 uppermost nodes; bracts linear, thick, .4 in. long; calyx-teeth very small but longer than the ring of hairs

24. *lanceaefolia*.

Leaves more or less serrate or crenate:—

Upper lip of corolla densely bearded with rufous hairs, villi of the calyx-throat white; whorls usually 1 or 2 terminal, large; bracts linear:—

Leaves lanceolate, acute, narrowed at base, crenate-serrate, tawny-villous, up to 4 in. long, 1.5 in. broad, petiole short; calyx-teeth short.25. *vestita*.

Leaves membranous, ovate, acute, narrowed at base, coarsely serrate, pubescent or glabrate, up to 5 in. long, 2.5 in. broad, petiole to 1 in.; calyx-teeth slender, spreading, ciliate, .1 in. long or longer.26. *ciliata*.

Upper lip of corolla densely bearded with white hairs; hairs of the stem and branches usually stiff, spreading or reflexed:—

Leaves thick, 3—5 in. long, ovate, acute, rounded or cordate at base,

crenate, tawny-villous above, softly whitish-tomentose beneath, 1·5—2·5 in. broad; whorls large, usually 1—2 terminal, 1 in. in diam.; bracts linear-lanceolate, 4 in. long; calyx-teeth slender, 0·75 in. long, spreading

27. *lamiifolia*.

Leaves narrow, usually under 1 in. broad, subobtusate, distantly and shallowly crenate, the nerves few, very oblique:—

Leaves rather thick, oblong, tawny-pubescent, 1—3 in. long, shortly petioled; whorls 1—2 terminal, 75—1 in. in diam.; calyx-teeth subulate, spreading, about 0·5 in. long; bracts linear-lanceolate.....28. *hirta*.

Leaves thick, linear-oblong or lanceolate up to 4 in. long, 1 in. broad, crenate, the 5—7 pairs of main nerves very oblique, impressed above, brown-hispid-pubescent, the hairs spreading; whorls many, in upper axils, up to 1 in. in diam.; calyx-teeth short, subulate, the villi conspicuous; bracts linear, pectinately ciliate.....29. *eristoma*.

Leaves thin, linear-oblong, nearly glabrous, up to 4 in. long, shortly petioled; whorls several in upper axils, 75 in. in diam.; calyx-teeth recurved, very short, about 0·25 in. long; the tube much constricted in the middle; bracts filiform.....30. *stelligera*.

Leaves small, ovate, obtuse, rounded at base, crenate, tawny-hispid-pubescent, up to 1 in. long, 5 in. broad, the nerves about 4—5 pairs, not oblique, petiole to 3 in.; whorls single, terminal, 75 in. in diam.; bracts subulate, 3 in. long, ciliate; calyx-teeth stiff and with stiff hairs, 1 in. long, as long as the dense villi; the tube 25 in. long.....31. *prostrata*.

1. *LEUCAS URTICAEFOLIA*, R. Br.; F. B. I. iv. 680; Wt. lc. t. 1451.
Deccan and Carnatic, on dry waste lands, often on black-cotton soil, common about Coimbatore, also about Tadpatri in Anantapur.
A soft annual herb with white flowers, the nutlets trigonous with the truncate top glandular.
2. *LEUCAS MARTINICENSIS*, R. Br.; F. B. I. iv. 688.
Deccan and Carnatic, Horsleykonda at 4,000 ft., Ramandrug in Bellary at 3,000 ft., hills of Salem and Coimbatore Districts, doubtfully indigenous.
A large herb with angular stems and white flowers, the nutlets trigonous with rounded back.
3. *LEUCAS NUTANS*, Spreng.; F. B. I. iv. 688.
N. Circars, in Ganjam (Barker); Deccan, in Cuddapah (Gamble).
A dwarf trailing herb, diffusely branched, with angular stems and white flowers.
4. *LEUCAS LINIFOLIA*, Spreng.; F. B. I. iv. 690.
N. Circars, Deccan and Carnatic, in pastures, waste lands and fallow fields, common.
An erect herb with rather large white flowers.
5. *LEUCAS WIGHTIANA*, Benth.; F. B. I. iv. 690.
Carnatic and S. Travancore, at Cape Comorin (Lawson).
A small erect scabrid herb.
6. *LEUCAS ZEYLANICA*, R. Br.; F. B. I. iv. 689; Wt. Ill. t. 176.
W. Ghats, Nilgiris, Pulneys and hills of Travancore 3,000—7,000 ft.; Shevaroy Hills of Salem.
A large erect pubescent or hispid herb with white flowers.
7. *LEUCAS ASPERA*, Spreng.; F. B. I. iv. 690.
Most plains Districts, and up to 3,000 ft., in fields and on waste land and roadsides, common.

A coarse erect diffusely branched annual herb with white flowers, the stems hispid or scabrid.

8. *LEUCAS CEPHALOTES*, Spreng.; F. B. I. iv. 689; Wt. Ic. t. 337 (not good).

All plains Districts; a weed of cultivated land.

A stout coarse herb with large terminal many-bracted conspicuous heads of white flowers, the corollas with the lower lip not much longer than the white-bearded upper. Vern. *Hind.* Dhurpi Ság.

9. *LEUCAS STRICTA*, Benth.; F. B. I. iv. 688.

N. Circars, Ganjam to Godavari, near the coast; Deccan, in the Ceded Districts, Mysore and Salem.

A small herb with 4-angled hispid slender stems and white flowers, the corollas with large obovate lower lip, much longer than the white-bearded upper.

10. *LEUCAS DIFFUSA*, Benth.; F. B. I. iv. 689.

E. Coast Districts, from the Godavari southwards, usually on sandy pastures near the sea; Shevaroy Hills (Perrottet). A small diffuse herb with trailing branches and rather large white flowers.

11. *LEUCAS NEPETAEFOLIA*, Benth.; F. B. I. iv. 681.

Deccan, Hyderabad journey (Heyne); Guntur District, at Bellamkonda (Cleghorn).

A shrubby plant with hoary branchlets, the flowers white, the lower lip of the corolla hardly longer than the white-bearded upper.

12. *LEUCAS BIFLORA*, R. Br.; F. B. I. iv. 683; Wt. Ic. t. 866.

Deccan and Carnatic and the lower E. slopes of the Gháts, southwards to S. Travancore; dry places on the W. Coast.

A slender procumbent softly pubescent herb, often straggling up and apparently climbing, the branches long, 4-angled, the flowers usually in pairs, corollas white.

Var. *procumbens*. *L. procumbens*, Desf.; F. B. I. iv. 683. Glabrous and with usually narrower leaves, shorter calyx-teeth and longer pedicels, but scarcely separable from the species.

Hills of S. Canara and Mysore.

13. *LEUCAS LANATA*, Benth.; F. B. I. iv. 681.

Hills of the Deccan and Carnatic, in dry places at low levels. N. slopes of Nilgiris, up to 3,000 ft.

An erect plant with many silky branches from a stout root-stock, the corollas rather large, white, with broad lower lip, longer than the white-bearded upper.

14. *LEUCAS MONTANA*, Spreng.; F. B. I. iv. 682.

N. Circars, on Mahendragiri, 4,500 ft. (Gamble), hills of Vizagapatam; Deccan, Kambakam Drúg, Ramandrúg in Bellary, at 3,000 ft.; N. side of Nilgiris at 3,000 ft.

A straggling undershrub with white flowers.

Var. *Wightii*, Hook. f. Calyx funnel-shaped, nearly 5 in. long, upper surface of leaves strigose, whorls many-flowered. Locality doubtful (Hb. Wight).

15. *LEUCAS MOLLISSIMA*, Wall.; F. B. I. iv. 682.
 Var. *scaberula*, Hook. f.
 N. Circars, forests of Ganjam and Vizagapatam; Rampa and Bison Hills of Godavari, to 2,000 ft.; hills of Mysore (Meebold).
 A straggling slenderly branched herb, sometimes climbing among bushes, the flowers white. Young leaves are often very silky, but the tomentum disappears as they get older and larger.
16. *LEUCAS CHINENSIS*, R. Br.; F. B. I. iv. 681.
 W. Gháts, hills of Malabar, Anamalai and Pulney Hills, at 3,000—4,000 ft. or higher.
 A somewhat shrubby straggling plant very variable in thickness of leaf and clothing, probably according to light and shade, the corollas white with the lower lip rather longer than the upper. The calyx-tube is villous on the upper half within but is not fringed at the mouth.
17. *LEUCAS ANGULARIS*, Benth.; F. B. I. iv. 684. *L. marrubiioides*, var. *pulneyensis*, Hook. f.; F. B. I. iv. 684.
 W. Gháts, Nilgiris, Pulneys and hills of Travancore, in evergreen forests at 3,000—5,000 ft. and perhaps higher.
 A herbaceous plant with long straggling branches and rather large white flowers.
18. *LEUCAS PUBESCENS*, Benth.; F. B. I. iv. 684.
 Without locality (Wight); Nilgiris, at 5,000 ft. (Clarke)?
 An erect herb with characteristic round broadly crenate leaves and white flowers.
19. *LEUCAS MARRUBIODES*, Desf.; F. B. I. iv. 683.
 W. Gháts, hills of Mysore and N. Coimbatore, Nilgiris, at 3,000—7,000 ft., less common in Pulneys (Wight).
 A stout straggling herb, the flowers white and large in very white-silky whorls with rather long internodes, the old leaves with the nerves impressed.
20. *LEUCAS SUFFRUTICOSA*, Benth.; F. B. I. iv. 685; Wt. Ic. t. 1454.
 W. Gháts, Nilgiri Hills, on the downs at and about 7,000 ft.
 A low undershrub with many slender stems from a thick woody rootstock, the corolla white, the upper lip prominently white-bearded.
21. *LEUCAS TERNIFOLIA*, Desf. *L. helianthemifolia*, Hook. f.; F. B. I. iv. 685 *in part*.
 W. Ghats, Anamalais, Pulneys and hills of Travancore, at high levels, above 6,000 ft.
 An undershrub with conspicuous smooth golden pubescence, having many slender branches from a stout rootstock. The whorls resemble those of the last species but they have not the long peduncle-like internodes.
22. *LEUCAS HELIANTHEMIFOLIA*, Desf.; F. B. I. iv. 685 *in part*. *L. ternifolia*, Wt. Ic. t. 1453, *not of* Desf.
 W. Gháts, Nilgiri Hills, at 5,000—7,000 ft., Pulneys scarce.
 A small shrub, with very white or tawny wool on the inflorescence, only the upper surface of the leaves green. The corollas are white and the white wool of the upper lip very thick. The

leaves are usually ternate or, as Wight says, ternate below, opposite above.

23. *LEUCAS ROSMARINIFOLIA*, Benth.; F. B. I. iv. 685; Wt. Ic. t. 1455.
W. Gháts, Nilgiri Hills, above 6,000 ft., often on roadsides.
A grey-green rather compact small shrub with the narrow leaves fascicled, many together, at the nodes. Flowers white in very silky whorls with rather large bracts.
24. *LEUCAS LANCEAEFOLIA*, Desf.; F. B. I. iv. 685; Wt. Ic. t. 1452.
W. Gháts, Nilgiri and Pulney Hills, above 6,000 ft., more or less gregarious on the margins of Shola woods.
A shrub, reaching 6—8 ft., and very bushy. Flowers white, rather small. Bark thin, grey; wood light brown. Some of the Pulney specimens show very faint shallow crenatures to the leaves.
25. *LEUCAS VESTITA*, Benth.; F. B. I. iv. 686; Wt. Ic. t. 338.
S. E. Wynaad (Lawson); Pulney Hills and hills of Tinnevely and Travancore, at low levels.
A tall tawny-villous soft herb with white lower lip to the corolla, the rufous upper lip characteristic.
26. *LEUCAS CILIATA*, Benth.; F. B. I. iv. 687.
W. Gháts, hills of S. Canara, Coorg, Mysore, to the S. E. Wynaad at 3,000 ft.
A straggling aromatic loosely branched herb, the corolla with upper lip clothed with yellowish-brown hairs (Cooke), the whorls very scabrous hispid.
27. *LEUCAS LAMIFOLIA*, Desf.; F. B. I. iv. 686.
W. Gháts, Nilgiris, at 6,000 ft.; common in "Old Forest," Coonoor.
A large straggling herb with tawny villous stem and leaves.
28. *LEUCAS HIRTA*, Spr.; F. B. I. iv. 687.
Deccan, in hilly country, up to 4,000 ft. on Horsleykonda; W. Gháts, in all Districts from S. Canara to Tinnevely.
A sub-shrubby branching herb from a stout rootstock, the leaves and stems variable in pubescence.
Var. *Beddomei*, Hook. f. Softly villous with spreading hairs the whorls more numerous, the villi of the calyx-mouth fewer and shorter. The hairs on the corolla upper lip seem to have a brown tinge.
Hills of S. Canara and Wynaad at 5,000—6,000 ft. (Beddome).
29. *LEUCAS ERIOSTOMA*, Hook. f.; F. B. I. iv. 686.
W. Gháts, in S. Canara (Barber), Wynaad (Heyne, de Monrhodon), Brumagiri Hills, 4,000—5,000 ft. (Fischer).
An undershrub with long narrow leaves, probably not very distinct from *L. hirta*, Spr.
Var. *latifolia*, Hook. f. Stout and with many and larger whorls, the leaves broader. Nilgiri or Coorg (G. Thomson).
Var. *lanata*, Hook. f. Branches and inflorescence clothed with long soft white spreading hairs, the whorls smaller.
Bababudan Hills of Mysore, also Nilgiris (Wight, Meebold).
30. *LEUCAS STELLIGERA*, Wall.; F. B. I. iv. 686. *L. eriostoma*, var. *longifolia*, Hook. f.; F. B. I. iv. 686.

W. Ghâts, hills of S. Canara and Mysore to Nilgiris, up to 3,000 ft.

An erect branching herb with usually simply pubescent stems, sometimes with long spreading hairs.

31. *LEUCAS PROSTRATA*, Gamble n. comb. *L. hirta*, Spr., var. *prostrata*, Hook. f.; F. B. I. iv. 687.

W. Ghâts, Nilgiris, above 5,000 ft., Anamalais (Beddome); Shevaroy Hills.

A low herb, with many hispid prostrate branches from a knotty rootstock, often rooting at the nodes, the scapes sometimes long and slender.

22. *Leonotis*, R. Br.

Herbs or shrubs, stems 4-gonous. *Leaves* opposite; floral leaves similar but smaller. *Flowers* large, scarlet or yellow, in axillary dense many-flowered whorls; bracts numerous, slender. *Calyx* 10-ribbed, tubular, the tube often incurved; mouth oblique with 8–10 rigid teeth, the upper tooth the largest. *Corolla* 2-lipped, the upper lip long, concave, with a villous crown, the lower lip small, 3-lobed, the mid-lobe largest. *Stamens* 4, didynamous, the lower pair longer, ascending; anthers connivent, the cells divaricate. *Disk* equal. *Ovary* 4-partite; style subulate, the upper lobe very short. *Fruit* of 4 oblong ovoid or obovoid, triquetrous, obtuse or truncate, dry nutlets, the basal scar small.

Calyx 1 in. long in all, the tube curved, the teeth very unequal and tipped with slender spines, the uppermost much the largest; *corolla* 1 in. long, the upper lip 5 in.; leaves broadly ovate, long-petioled, up to 8 in. long, 5 in. broad, coarsely serrate.....*L. nepetaefolia*.
Calyx 5–75 in. long, the tube straight, the teeth very small subequal; *corolla* 2 in. long or more, the upper lip nearly 1 in.; leaves oblong-lanceolate, short-petioled, obtuse and shortly serrate.....*Leonurus*.

LEONOTIS NEPETAEFOLIA, R. Br.; F. B. I. iv. 691; Wt. Ic. t. 867.

Most plains Districts, on roadsides and in waste places, chiefly near villages, often cultivated, doubtfully indigenous. A tall herb reaching 6 ft. high with obtusely 4-angled stems, long internodes and spinous whorls of orange-scarlet flowers, the upper lip densely woolly.

L. Leonurus, R. Br., is sometimes found in gardens and is easily recognized by the very long orange-scarlet handsome corolla. It is native of S. Africa.

23. *Salvia*, Linn.

Herbs or shrubs of various habits. *Flowers* small or large and showy, whorls usually racemose or spicate; bracts small or large and often coloured. *Calyx* tubular or campanulate, 2-lipped, throat naked; upper lip entire or 3-lobed, lower 2-fid. *Corolla* 2-lipped; tube naked or with a ring of hairs inside; upper lip erect, entire; lower 3-lobed, the lateral lobes spreading. *Stamens* 2 (the lower pair) perfect, the upper pair reduced to staminodes or obsolete; filaments short, articulate with the slender connective, sometimes produced

beyond the joint; anthers dimidiate, connective linear, transverse, the posterior arm ascending and bearing a linear fertile cell, the anterior arm straight or deflexed, with a fertile or empty cell or naked. *Disk* usually enlarged in front. *Ovary* 4-partite; style shortly bifid, the lobes equal or the anterior longer. *Fruit* of 4 ovoid-triangular dry smooth nutlets, the basal scar small.

SALVIA PLEBEIA, R. Br.; F. B. I. iv. 655.

Most plains Districts, a weed of roadsides and waste land.

An erect pubescent herb with very small lilac or white flowers in whorls in panicles of slender racemes especially in fruit when the calyx is much enlarged. Leaves petioled, oblong-lanceolate or -spathulate, crenate, 2—5 in. long. Nutlets mucilaginous when wetted.

Salvia officinalis, Linn., is the Sage plant occasionally cultivated in gardens. Several species are also cultivated in gardens for their showy flowers.

24. *Gomphostemma*, Wall.

Herbs or undershrubs, stellately pubescent or tomentose, the roots often bearing tubers. Leaves opposite, large, entire or dentate or crenate, floral leaves similar or bract-like. Flowers rather large, usually yellow, in short cymes forming whorls which are axillary or in dense terminal spikes; bracts many, usually linear. Calyx campanulate, equally 5-lobed, 10-ribbed. Corolla 2-lipped; tube slender, the throat more or less dilated; upper lip hooded, lower broadly 3-lobed, the lobes spreading. Stamens 4, didynamous, ascending, the lower pair the longer; anthers approximate in pairs, 2-celled, the cells parallel. Disk uniform or slightly swollen. Ovary 4-partite, style slender, 2-fid, the lobes subulate, nearly equal. Fruit of 4, or, by reduction, 3—4 glabrous or pubescent, corky or fleshy nutlets, the basal scar broad.

Whorls combined in terminal spikes, sometimes with others axillary in upper nodes as well; floral leaves elliptic-ovate, cordate; calyx lobes lanceolate, acuminate, .5 in. long; corolla-tube .4 in. long, slender, lower lip as long, broad; leaves elliptic ovate, subacute, rounded and then abruptly and acuminate decurrent on the petiole, closely serrate, shortly hirsute above, densely tomentose beneath, up to 9 in. long, 5 in. broad.....1. *Heyneanum*.

Whorls axillary; calyx-teeth slender, corolla-tube elongate:—

Cymes of the whorls pedunculate; calyx-teeth subulate, very grey stellate hairy, .2 in. long; corolla 1 in. long, glabrate; floral leaves lanceolate; bracts linear; leaves elliptic to oblanceolate, acuminate, distantly shallowly crenate, up to 9 in. long, 4.5 in. broad.....2. *parviflorum*.

Cymes of the whorls sessile; calyx-teeth very slender, .15—.25 in. long, subglabrous; corolla 1 in. long, villous without; floral leaves ovate; bracts lanceolate; leaves elliptic-oblong or lanceolate, acute, sharply dentate, up to 6 in. long, 2 in. broad.....3. *eriocarpon*.

1. *GOMPHOSTEMMA HEYNEANUM*, Wall.; Wt. Ic. t. 1456;

Prain, Ann. Calc. iii. t. 79. *G. strobilinum*, Wall., var. *Heyneana*, Hook. f.; F. B. I. iv. 696.

W. Gháts, S. E. Wynaad at 3,000 ft. (Lawson), Anamalai Hills at 3,000 ft. (Gamble), evergreen forests of Travancore (K. Venkoba Row), hills of Tinnevely.

A tall shrubby herbaceous plant, covered with stellate hairs, the flowers yellow (Lawson, Gamble), blue with purple tinge (Wight), the nutlets glabrous.

Var. *Rottleri*, Prain, Ann. Calc. iii. t. 80. Leaves crenate, the upper surface less hirsute, the stems furrowed.

W. Gháts, Mudumalai forest at 2,000 ft. (Gamble), Anamalai Hills (Barber), hills of Travancore and Tinnevely (Rottler, Wight).

2. *GOMPHOSTEMMA PARVIFLORUM*, Wall. ; F. B. I. iv. 697 ;

Prain, Ann. Calc. iii. t. 87 (var. *farinosa*).

N. Circars, hills of Ganjam at 3,000 ft. (Barber), Rangalu in Vizagapatam at 3,400 ft. (A. W. Lushington).

An erect large herb, softly stellate tomentose, the flowers yellow.

3. *GOMPHOSTEMMA ERIOCARPON*, Benth. ; F. B. I. iv. 698 ;

Prain, Ann. Calc. iii. t. 90. *G. oblongum*, Wt. Ic. t. 1457, not of Wall.

W. Gháts, Anamalai Hills and hills of Travancore and Tinnevely, at about 2,000 ft., in evergreen forests.

A slender erect herbaceous plant with simple or stellate hairs, the flowers yellow, the nutlets tomentose.

25. *Teucrium*, Linn.

Herbs or shrubs. *Leaves* opposite, entire serrate or lobed, floral leaves often bract-like. *Flowers* usually small, in whorls of 2—6, in axillary or terminal spikes, racemes or heads. *Calyx* 2-lipped, 10-ribbed ; teeth 5, the uppermost usually largest. *Corolla*-tube not annulate ; limb 1-lipped, the 2 upper and the lateral lobes short or even obsolete, the end lobe large. *Stamens* 4, didynamous, the lower pair longest, all exserted ; anthers reniform, the cells short, at length confluent. *Disk* equal. *Ovary* 4-lobed ; style bifid, the lobes subequal. *Fruit* of 4 obovoid rugosely reticulate nutlets, the scar oblique or lateral, large.

Inflorescence densely villous with tawny often glandular hairs, the racemes in close panicles ; bracts lanceolate ; upper and side lobes of corolla-lip short and rounded :—

Leaves thin, ovate, acute, truncate or cuneate and entire at base, rest serrate or crenate, often doubly, sparsely pubescent above, more so beneath, up to 3 in. long, 2 in. broad, petiole slender, .5—1.5 in. long.....1. *tomentosum*.

Leaves thick, ovate, obtuse, rounded or cordate at base, crenulate, rugose and strigosely hairy on both surfaces, up to 1.5 in. long, 1 in. broad, petiole stout, .25—5 in. long.....2. *Wightii*.

Inflorescence with few glandular hairs, glabrescent, the racemes in slender leafy panicles ; bracts linear-lanceolate ; upper lobes of corolla lip curved acuminate, side lobes acute ; leaves thin, ovate, acute, rounded or cordate at base and then often acutely decurrent, sharply serrate, nearly glabrous above, minutely puberulous beneath, up to 2 in. long, 1.5 in. broad, petiole slender, .5—75 in. long

3. *plectranthoides*.

1. *TEUCRIUM TOMENTOSUM*, Heyne ; F. B. I. iv. 700.

W. Gháts, Nilgiris, Pulneys and hills of Tinnevely and Travancore, up to about 5,000 ft. ; Bababudan Hills of Mysore ; Kollimalai Hills of Trichinopoly.

An erect copiously flowering herb reaching 3 ft. in height, the flowers apparently yellowish (Benth.), the nutlets globose, granulate.

2. *TEUCRIUM WIGHTII*, Hook. f.; F. B. I. iv. 701. *T. tomentosum*, Wt. Ic. t. 1458, not of Heyne.

W. Gháts, Nilgiri Hills about Doddabetta at 7,000—8,000 ft., in dry rocky places.

A thick stout herb with short branches and pale purple flowers (Fyson).

3. *TEUCRIUM PLECTRANTHOIDES*, Gamble in Kew Bull., 1924, ined.

W. Gháts, near Sengalteri, Tinnevely (Hb. Madr.).

A slender erect herb with 4-angled stems, almost glabrous and with the flowers in spreading panicles of open racemes, the corolla rather large.

26. *Ajuga*, Linn.

Herbs, often decumbent or stoloniferous. *Leaves* opposite, usually coarsely toothed, floral leaves subsimilar. *Flowers* sessile in 2- or more-flowered whorls, axillary or in terminal leafy spikes. *Calyx* 5-lobed, lobes subequal. *Corolla* 2-lipped; tube often annulate within, straight or dilated and curved; upper lip short, 2-fid, lower lip spreading, the mid-lobe largest. *Stamens* 4, didynamous, ascending, the lower pair longest, exserted or included; anthers 2-celled, the cells divaricate, at length confluent. *Disk* uniform or swollen behind. *Ovary* 4-lobed; style slender, 2-fid, the stigmatic lobes nearly equal. *Fruit* of 4 obovoid rugosely reticulate nutlets, the scar lateral, large.

AJUGA MACROSPERMA, Wall.; F. B. I. iv. 704.

N. Circars, in Ganjam, up to 4,500 ft. on Mahendragiri (Beddome, Gamble, Barber).

A decumbent villous herb with blue flowers, the leaves soft, ovate or ovate-oblong, coarsely dentate, up to 4 in. long, 2 in. broad.

Nepeta ruderalis, Ham., is an aromatic herb believed to be occasionally found on roadside and waste lands in Northern Districts, though actual Madras specimens have not been examined.

Meriandra bengalensis, Benth., is the Bengal Sage, a pretty though straggling shrub with leaves like those of the cultivated sage (*Salvia officinalis*, Linn.) but strongly smelling of camphor. It is often cultivated and frequently found run wild. Its home is Abyssinia.

Family CXVI. PLANTAGINACEAE.

Scapigerous herbs. *Leaves* usually radical. *Flowers* small, greenish, spicate, often dimorphic, bracteate. *Sepals* 4, imbricate in bud, persistent. *Corolla* hypogynous, scarious, salver-shaped; lobes 4, short, imbricate in bud. *Stamens* 4, inserted on the corolla-tube; filaments capillary, persistent; anthers large, pendulous, versatile. *Ovary* superior, 1—4-celled; ovules 1 or more in each cell; style filiform with 2 lines of stigmatic hairs. *Fruit* a small membranous capsule, 1—4-celled.

dehiscence circumscissile. *Seeds* usually peltate, attached by the centre; testa thin, mucilaginous; albumen fleshy; embryo cylindric, transverse; radicle inferior.

Plantago, Linn.

Characters of the Family.

PLANTAGO ASIATICA, Linn.; Wt. Ill. t. 177. *P. major*, Hook. f.; F. B. I. iv. 705 *in part*.

Nilgiri and Pulney Hills, at high levels, in waste places and by roadsides. Plantain.

A perennial herb with erect stout rootstock and radical leaves, these are ovate, entire or more usual coarsely dentate or lobed, 3—5-ribbed, long-petioled, the flowers in long spikes with rather large bracts, the capsules many-seeded. It differs somewhat from the common European weed *P. major*, Linn.

P. lanceolata, Linn., the Ribwort Plantain, is occasionally found in the Nilgiris, probably introduced, as suggested by Trimen for Ceylon, with British grass-seed.

FLORA
OF THE
PRESIDENCY OF MADRAS

BY
J. S. GAMBLE, C.I.E., M.A., F.R.S., F.L.S.
LATE OF THE INDIAN FOREST DEPARTMENT

PART VII
NYCTAGINACEAE TO EUPHORBIACEAE.

PUBLISHED UNDER THE AUTHORITY
OF THE GOVERNMENT OF INDIA

CALCUTTA

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INTRODUCTION TO PART VII.

SINCE the issue of Part VI supplementary notes on Parts I, III, V and VI have appeared as No. V of "Notes on the Flora of Madras" in the 'Kew Bulletin' for 1924, p. 235.

It is with great regret that I have to record the death of Mr. J. S. Gamble on October 16th. Mr. Gamble had corrected all the proofs and had seen the final revises of all but the last two sheets through the press before his death.

ARTHUR W. HILL.

ROYAL BOTANIC GARDENS, KEW ;
November, 1925.

FLORA OF MADRAS.

IV. MONOCHLAMYDEAE.

Sepals distinct, herbaceous, rarely petaloid, imbricate or valvate, or connate in a tube with imbricate or valvate lobes. *Petals* usually 0, very rarely 1-seriate and like the *sepals*, more rarely 1-seriate and truly coralline, inserted on the disk or adnate to the ovary. *Torus* small, or raised and stalk-like. *Stamens* few, rarely numerous, inserted on the torus or rarely on the base of the perianth. *Carpels* 1 or more, free or connate.

Family CXVII. NYCTAGINACEAE.

Herbs, shrubs or trees. *Leaves* usually opposite, entire; stipules 0. *Flowers* hermaphrodite, rarely unisexual, regular, sometimes dimorphous; inflorescence various, the flowers often involucrate. *Perianth* monophyllous, petaloid, usually small; tube persistent, campanulate funnel-shaped or salver-shaped, enveloping the fruit; limb 3—5-lobed, persistent or deciduous, the lobes plicate in bud. *Stamens* 1—30, hypogynous, sometimes unilateral; filaments usually unequal, inflexed in bud; anthers included or exserted, dorsifixed, didymous. *Ovary* free, 1-celled; style filiform, involute in bud; stigma small; ovule solitary, basal, erect. *Fruit* indehiscent, enclosed in the hardened perianth-tube. *Seed* erect; testa thin, adherent; albumen soft or floury; embryo curved or straight and with folded cotyledons; radicle inferior.

Erect or diffuse herbs; embryo hooked, the radicle long; limb of perianth funnel-shaped, 5-lobed on the margin, the lobes plicate; flowers paniculate or umbellate

1. **Boerhaavia.**

Trees or shrubs, sometimes climbing; embryo straight, the radicle short; limb of perianth 5—10-lobed, of ♂ flower funnel-shaped, of ♀ tubular, lobes induplicate-valvate; flowers in corymbose cymes.....2. **Pisonia.**

1. **Boerhaavia**, Linn.

Erect or diffuse herbs, often divaricately branched. *Leaves* opposite, often in unequal pairs. *Flowers* small, in panicles umbels or heads, articulated with the pedicels; bracteoles small, often deciduous, rarely involucrate. *Perianth*-tube long or short, ovoid below, narrowed above the ovary; limb funnel-shaped or campanulate, 5-lobed. *Stamens* 1—5, connate below around the ovary, exserted; filaments capillary, unequal; anthers didymous. *Ovary* oblique, stipitate; ovule erect; stigma peltate. *Fruit* small, enclosed in the ovoid turbinate or clavate, truncate, ribbed or angled, viscidly glandular perianth-tube. *Seed* with adherent testa; embryo hooked; cotyledons thin, broad, the outer the larger, enclosing the soft floury albumen; radicle long.

Fruit glandular on the ribs, not at the crown:—

Flowers sessile or very nearly so, in panicles of subcapitate umbels with lanceolate minute bracteoles; perianth very short, urceolate; fruit clavate, 5-ribbed, viscidly glandular:—

Leaves thick, in unequal pairs, ovate oblong or suborbicular, acute or obtuse, rounded or subcordate at base, glabrous above, white beneath, somewhat undulate on the margin, up to 2 in. long, 1·25 in. broad, petiole slender, up to 1 in. long, nerves 3—4 pairs.....1. *diffusa*.

Leaves coriaceous, in equal or unequal pairs, ovate or ovate-oblong, obtuse, rounded at base, scabrid on both surfaces, crispate-undulate on the margins, up to 1 in. long, ·75 in. broad, petiole up to ·25 in. long, nerves 5—6 pairs, prominent when dry.....2. *crispa*.

Flowers on capillary pedicels in umbels with linear lanceolate bracteoles; perianth ·25 in. long with slender tube and funnel-shaped limb; fruit clavate with large glands; leaves thick, triangular-ovate, acute, rounded or cordate at base, glabrous above, pubescent beneath, repand sinuate, up to 3 in. long, 1·5 in. broad, petiole to ·5 in.....3. *repanda*.

Fruit with large stalked globose glands on the crown, clavate; flowers in long-pedunculate racemes, in few-flowered whorls on a slender rhachis; pedicels filiform, perianth-tube slender, limb funnel-shaped; leaves thick, broadly ovate or suborbicular, obtuse, mucronate, cordate at base, glabrous, the margins sinuate, up to 2·25 in. long and broad, petiole to ·75 in.....4. *verticillata*.

1. *BOERHAAVIA DIFFUSA*, Linn. *B. repens*, Linn.; F. B. I. iv. 709.
B. procumbens, Roxb.; Wt. Ic. t. 874.

All plains Districts, also to some height in the hills, a weed of waste lands and road-sides.

A diffuse herb with stout rootstock and many erect or procumbent branches, the flowers red, the fruit very viscid, easily detached and so adherent to clothes or the fur of animals. It is very variable according to soil and climate.

2. *BOERHAAVIA CRISPA*, Heyne in Wall. Cat. 6771; F. B. I. iv. 709.
Deccan, in dry Districts (Heyne).

A stout very scabrid herb, with long peduncles.

3. *BOERHAAVIA REPANDA*, Willd.; F. B. I. iv. 709; Wt. Ic. t. 1766.
Deccan, in dry Districts.

A diffuse herb with pink flowers, often found climbing among bushes, the fruit with conspicuous viscid glands.

4. *BOERHAAVIA VERTICILLATA*, Poir.; F. B. I. iv. 710. *B. stellata*, Wt. Ic. t. 875.

Deccan and Carnatic, in dry Districts, often on black cotton soil.
A diffuse herb with long branches, white flowers and a fruit with curious glands round the top.

2. *Pisonia*, Linn.

Trees or shrubs, unarmed or with axillary spines. *Leaves* opposite or alternate, entire. *Flowers* small, usually dioecious, in panicle, subsessile or pedunculate cymes, bract and bracteoles small. *Male flowers*: perianth campanulate, the limb 5-lobed, the lobes induplicate-valvate; stamens 6—10, exserted, filaments connate below in a tube or ring, anthers oblong or didymous. *Female flowers*: perianth tubular, usually enlarged at base; ovary sessile, elongate, style included or exserted; stigma capitellate, peltate or fimbriate. *Fruit* enclosed in the coriaceous, oblong linear or clavate, perianth-base, compressed or 5-angled, usually with rows of viscid stipitate glands; utricle

membranous. *Seed* with a hyaline testa adnate to the pericarp, embryo straight; albumen soft, enclosed in the cotyledons, radicle inferior.

PISONIA ACULEATA, Linn.; F. B. I. iv. 711; Wt. Ic. tt. 1763—64.

N. Circars, Ganjam to Godavari, on the Coast, in forest lands, hedges and bushes, common, less so southwards as at Striharikota. Occasionally found inland, as in Anamalais, at 1,200 ft. (Fischer). A large thorny climbing shrub with opposite coriaceous elliptic or ovate leaves up to 3 in. long, the flowers in dense corymbose cymes, greenish-white. Wood of peculiar and interesting structure. The plant makes a good hedge, green or dry. Inland specimens are sometimes without thorns. Vern. *Ur.* Hati-ankusa.

P. morindifolia, R. Br.; Wt. Ic. t. 1765, is the Tree Lettuce, a small tree of the beach forests of the Andaman Islands, frequently found in gardens in Madras and other places near the sea on both coasts and noticeable for its very pale green leaves.

Mirabilis Jalapa, Linn., the Marvel of Peru, is a large herbaceous plant with showy flowers of various colours, crimson yellow white or striped, frequently grown in gardens and often seen run wild.

Bougainvillea spectabilis, Willd., and *B. glabra*, Chois., are large thorny climbing Brazilian shrubs very common in gardens. They have small pale yellow flowers with large and conspicuous magenta or purple bracts. A variety (*B. lateritia*) has the bracts brick-red and the leaves nearly tomentose.

Family CXVIII. AMARANTACEAE.

Herbs, rarely shrubs, erect or climbing. *Leaves* opposite or alternate; stipules 0. *Flowers* usually hermaphrodite, rarely polygamous or dioecious, small, usually in terminal and axillary, simple or paniced, spikes cymes or clusters; bracts hyaline or scarious; bracteoles 2, scarious. *Perianth* dry, calycine, persistent, usually of 5 free or slightly connate hyaline or scarious imbricate segments. *Stamens* 1—5, opposite the perianth segments; filaments free or connate below in a membranous hypogynous cup, often alternating with membranous staminodes; anthers dorsifixed, 1- or 2-celled. *Ovary* 1-celled, ovoid ellipsoid or globose; ovules 1 or more, amphitropous, erect or suspended from basal funicles; style sometimes simple with capitellate stigma, sometimes 2—3-fid with acute stigmas or styles 2 or 3 papillosely stigmatic on the lower face. *Fruit* a membranous utricle, rarely a berry or a capsule, breaking irregularly or circumscissile. *Seed* erect or inverted, orbicular ovate or reniform, compressed; testa crustaceous; tegmen, if present, membranous; embryo horseshoe-shaped or annular, surrounding a floury albumen.

Anthers 2-celled:—

Leaves alternate:—

Seeds several, utricle circumscissile.....1. **Celosia.**

Seeds solitary, erect:—

Flowers hermaphrodite:—

Flowers paniced; fruit an indehiscent utricle.....2. **Banalia.**

Flowers capitate; fruit a circumscissile utricle.....3. **Allmania.**

Flowers spicate; fruit indehiscent, crustaceous, rugose.....4. **Digera.**

- Flowers unisexual; fruit an indehiscent or circumscissile utricle
5. *Amarantus*.
 Leaves opposite; ovule and seed solitary, suspended from a basal funicle:—
 Flowers clustered, 1–3 perfect surrounded by others imperfect with hooked bristles or awns:—
 Stamens with interposed staminodes.....6. *Cyathula*.
 Staminodes 0.....7. *Pupalia*.
 Flowers all perfect:—
 Staminodes 0:—
 Perianth-segments ribbed; stamens 5:—
 Flower-spikes axillary.....8. *Psilotrichum*.
 Flower-spikes paniced.....9. *Psilostachys*.
 Perianth-segments hyaline; stamens 1 or 2.....10. *Nothosaerva*.
 Stamens with interposed staminodes; perianth-segments, bracts and bracteoles hardened, spinescent.....11. *Achyranthes*.
 Leaves alternate or fascicled, or with opposite and alternate mixed; stamens with interposed staminodes.....12. *Aerva*.
 Anthers 1-celled; leaves opposite; flowers in small clusters.....13. *Alternanthera*.

1. *Celosia*, Linn.

Herbs, usually annual, the stems sometimes woody below. *Leaves* alternate. *Flowers* hermaphrodite, in terminal or axillary, often dense, often interrupted spikes, sessile or shortly pedicelled, white or coloured; bracts and bracteoles scarious, shining. *Perianth*-lobes 5, calycine, slightly connate below, scarious, oblong or lanceolate. *Stamens* 5; filaments slender, connate below in a membranous hypogynous cup; anthers 2-celled. *Ovary* 1-celled, ovoid or subglobose; ovules 2 or more on long funicles from the base of the ovary; style 0 or short or long, sometimes elongating in fruit; stigma simple. *Fruit* a utricle dehiscing in circumscissile fashion near the middle, membranous or sometimes corky or coriaceous. *Seeds* 2 or more, erect, lenticular; testa crustaceous, black, often shining; embryo annular, surrounding the floury albumen; cotyledons linear.

Flowers in dense stout imbricate spikes 1–6 in. long, the perianth often pink at first, but becoming later shining white, its lobes about .25 in. long; leaves variable, linear or linear-lanceolate, rarely ovate or lanceolate, sometimes reaching 6 in. long and 1.5 in. broad.....1. *argentea*.

Flowers in small clusters in slender interrupted spikes:—

- Perianth-lobes .1 in. long; utricle gradually narrowed at apex, with style and 2 recurved stigmas; leaves ovate or lanceolate, acuminate, narrowed at base, up to 3 in. long, 2 in. broad, petiole to 1.5 in. long.....2. *pulchella*.
 Perianth-lobes about .075 in. long; utricle with a thickened head at apex, the 2 stigmas short and slender, recurved; leaves ovate, obtuse or subacute, rounded at base, up to 1.5 in. long, 1 in. broad, petiole to .75 in.....3. *polygonoides*.

1. *CELOSIA ARGENTEA*, Linn.; F. B. I. iv. 714; Wt. Ic. t. 1767.

All plains Districts, chiefly on cultivated land or among grasses, up to 4,000 ft. in the hills, common but not really indigenous. An erect glabrous annual up to 3 ft. high, the long shining flower-heads conspicuous.

2. *CELOSIA PULCHELLA*, Moq.; F. B. I. iv. 715; Wt. Ic. t. 1768.

Deccan, Horsleykonda in Chittoor, 4,000 ft. (Gamble); W. Gháts, Nilgiris, Pulneys and hills of Tinnevely and Travancore, at 3,000–6,000 ft.

A slender diffuse herb, the branches glabrous.

3. CELOSIA POLYGONOIDES, Retz.; F. B. I. iv. 715.

Deccan and Carnatic, on sandy soils.

A diffuse herb with many branches from a stout rootstock.

C. cristata, Linn., the Cockscomb plant, commonly cultivated in gardens and sometimes found as an escape, is easily recognized by the curious monstrous fasciated growth of its inflorescence, which may be red or yellow usually. It is very closely allied to *C. argentea*, and may be a variety of that species.

2. Banalia, Moq.

An erect glabrous branching herb. *Leaves* alternate, membranous. *Flowers* hermaphrodite, in clusters in axillary or terminal spikes, usually forming pale chaffy thyrsoid panicles; bracts hyaline, also the 2 bracteoles. *Perianth*-segments 5, calycine, oblong, scarious, membranous, 3-nerved. *Stamens* 5, the filaments united below in a cup; anthers 2-celled. *Ovary* ovoid, compressed; style erect; stigmas 2, recurved, papillose; ovule 1, pendulous on a slender funicle. *Fruit* a subglobose, indehiscent utricle. *Seed* orbicular, the testa black, crustaceous.

BANALIA THYRSIFLORA, Moq.; F. B. I. iv. 716; Wt. Ic. t. 1774.

W. Ghâts, from Wynaad southwards, at 2,000—6,000 ft.

A slender tall herb with conspicuous white or cream-coloured thyrsoid panicles; leaves rhomboid-ovate or ovate-lanceolate, acuminate, up to 4 in. long, 2 in. broad.

3. Allmania, R. Br.

Erect or diffuse herbs. *Leaves* alternate, entire. *Flowers* hermaphrodite; in small dichasia, usually of 3, the centre one sessile with 1 or no bracteoles, the side ones pedicellate with 1 bract and 2 bracteoles; these dichasia are collected in terminal or axillary globose or oblong heads; bracts and bracteoles narrow, scarious, usually hispid, with filiform tips. *Perianth* calycine, of 5 nearly free oblong lanceolate scarious lobes. *Stamens* 5, the filaments connate in a membranous hypogynous cup, anthers 2-celled. *Ovary* ovoid, narrowed in a straight style; ovule 1, erect; stigma 2-lobed. *Fruit* a subglobose or ovoid membranous utricle, circumscissily dehiscent. *Seed* erect, subglobose, in a cup-shaped arillus; testa black, shining, crustaceous; embryo annular, surrounding copious albumen; cotyledons linear; radicle inferior.

Flower-heads usually sessile, brown, globose; prostrate diffuse or rarely erect herbs with extremely variable leaves.....1. *nodiflora*.
Flower-heads more or less peduncled, white, oblong or ovoid, rarely globose; erect pale herbs with usually narrow spatulate leaves up to 5 in. long

2. *longepedunculata*.1. ALLMANIA NODIFLORA, R. Br.; F. B. I. iv. 716 (var. *Roxburghii*, Hook. f.).

Circars and Carnatic, in coast Districts.

A straggling many-branched herb with stout root-stock and obovate spatulate apiculate leaves, the flower-heads usually 5 in. in diam. Closely allied and often difficult to distinguish are the following varieties, established in the 'F. B. I.'

Var. *procumbens*, Hook. f. *Chamissoa nodiflora*, Wt. Ic. t. 1770, prostrate with long prostrate branches, small, variable, linear to orbicular leaves and small flower-heads. Coast of the Carnatic, on sand.

Var. *aspera*, Hook. f. *Chamissoa aspera*, Wt. Ic. t. 1772, erect but diffuse and hispidly hairy, the leaves linear-oblong or lanceolate, the flower-heads larger, often .75 in. in diam. Deccan Districts, west to the E. slopes of the Ghâts, less common in Circars or Carnatic, in fields.

Var. *dichotoma*, Hook. f. *Chamissoa dichotoma*, Moq.; Wt. Ic. t. 1771, erect dichotomous and nearly glabrous with elliptic or ovate apiculate leaves. Carnatic, from Salem and Nellore southwards.

Var. *angustifolia*, Hook. f. Erect, sometimes tall and slender, with linear or linear-oblong leaves often up to 3 in. long, and rather large sometimes peduncled flower-heads. N. Circars, Deccan, Carnatic and E. slopes of the W. Ghâts up to 6,000 ft.

2. ALLMANIA LONGEPEDUNCULATA, Gamble n. comb. *A. nodiflora*, R. Br., var. *longepedunculata*, Trimen. *A. albida*, R. Br.; F. B. I. iv. 717. *Chamissoa albida*, Wt. Ic. t. 1769.

Circars, Deccan and Carnatic, but chiefly near the coast.

A tall erect herbaceous plant with pale (even when dry) leaves and white flower-heads often with rather long peduncles.

4. *Digera*, Forsk.

An annual herb. *Leaves* alternate, entire, petioled. *Flowers* hermaphrodite, in axillary peduncled spikes, ternate, the 2 outer reduced to crested scales, the central perfect; bracts and bracteoles persistent. *Perianth* calycine, submembranous; segments 5, oblong, erect, the 2 outer larger. *Stamens* 5, hypogynous; filaments free, filiform; anthers 2-celled. *Ovary* 1-celled, compressed truncate; style filiform; stigmas 2, short, recurved. *Fruit* a subglobose, crustaceous, rugose nut enclosed in the perianth. *Seed* globose, erect; testa thin, adhering to the albumen; embryo annular; cotyledons linear.

DIGERA ARVENSIS, Forsk.; F. B. I. iv. 717. *Desmochoea muricata*, DC.; Wt. Ic. t. 732.

Deccan and Carnatic, a weed of roadsides and waste places. A slender herb with prostrate branches, the leaves variable, ovate elliptic or lanceolate, acute or obtuse, up to 3 in. long and nearly 2 in. broad, the petioles slender, often 1 in. long.

5. *Amarantus*, Linn.

Erect or decumbent annual herbs. *Leaves* alternate. *Flowers* small, monoecious, in axillary clusters or dense terminal thyrsoid panicles; bracts herbaceous, often persistent; bracteoles 2. *Perianth* calycine, of 2—5 membranous lobes, the ♂ usually ovate-lanceolate, awned, the ♀ oblong or obovate, usually mucronate and often smaller. *Stamens* 2—5, as many as the perianth-lobes; filaments free; anthers 2-celled. *Ovary* ovoid, compressed, 1-celled; ovule solitary, erect; styles short or 0; stigmas 2—3. *Fruit* an orbicular or ovoid compressed utricle, membranous and usually circumscissile, or coriaceous and indehiscent. *Seed* erect, orbicular, compressed; testa crustaceous; embryo annular, enclosing the floury albumen; cotyledons linear; radicle inferior.

Bracteoles awned or setaceous, equalling or exceeding the perianth-lobes; utricle dehiscent, circumscissile:—

Stamens and perianth-lobes 5 each:—

Leaf-axils with spines; leaves ovate or oblong, obtuse; bracts bristle-tipped; flower-clusters in dense or lax panicles, the axils often with spines

1. *spinosus*.

Leaf-axils not spinous; leaves elliptic or ovate-lanceolate; bracts acicular; flowers in thyrses:—

Leaves acute or acuminate; bracts recurved, exceeding the oblong-lanceolate acuminate perianth-lobes.....2. *paniculatus*.

Leaves obtuse, rarely acute; bracts hardly recurved, scarcely exceeding the ovate or obovate mucronate perianth-lobes.....3. *caudatus*.

Stamens and perianth-lobes 3 each:—

Erect plants, the flowers clustered in lower axils and also gradually joined in a long terminal spiciform panicle; leaves large but variable, long-petioled; perianth-lobes awned:—

Stigmas short and straight; awns of perianth-lobes long and tapering; leaves ovate, acute, cuneate at base, up to 5 in. long, 3 in. broad, petiole to 3 in., sometimes lanceolate or linear-lanceolate.....4. *gangeticus*.

Stigmas long and feathery; awns of perianth-lobes short, shorter in ♂ than in ♀, but the ♂ flowers generally larger; leaves elliptic-lanceolate, acuminate, cuneate and decurrent at base, up to 6 in. long, 2 in. broad, petiole to 2 in.

5. *Caturus*.

Diffuse, no terminal spike; stigmas short; awns of perianth-lobes short and abrupt; leaves ovate-elliptic or deltoid-ovate, emarginate, up to 1.5 in. long, 1 in. broad, the petiole to 1 in.....6. *mangostanus*.

Bracteoles acute or slightly awned, shorter than the perianth-lobes; utricle rugose; stamens and perianth-lobes 3 each:—

Utricle prominently rugose, indehiscent, acute; flowers in axillary and terminal panicles slender spikes; leaves ovate or deltoid, obtuse and often emarginate at apex, truncate or cuneate at base, up to 3 in. long, 2 in. broad, petiole to 2 in.....7. *viridis*.

Utricle ovoid, slightly rugose or waved, usually circumscissile; flowers in axillary clusters; leaves obovate, obtuse, rarely retuse, usually mucronate, cuneate at base, dotted, up to 1 in. long, .5 in. broad, petiole to .5 in.....8. *polygamus*.

1. *AMARANTUS SPINOSUS*, Linn.; F. B. I. iv. 718; Wt. Ic. t. 513.

All plains Districts, in waste places, fields and gardens and on roadsides; a common and troublesome weed.

An erect spinous herb with hard often reddish stems. The leaves are sometimes eaten as spinach. Vern. *Hind.* Kanta nutiya; *Tam.* Mulluk kirai.

2. *AMARANTUS PANICULATUS*, Linn.; F. B. I. iv. 718. *A. frumentaceus*, Buch.-Ham.; Wt. Ic. t. 720.

Deccan and other hilly regions, cultivated and run wild.

A tall annual herb grown for its seeds, which may be white red or black; the leaves give a good spinach though difficult to pick. Vern. *Tam.* Púngi kirai.

3. *AMARANTUS CAUDATUS*, Linn.; F. B. I. iv. 719.

Hills of Deccan and W. Gháts, cultivated only, chiefly in gardens, perhaps also sometimes found run wild. Lovelies-bleeding.

A tall herb with long heavy drooping thyrses of crimson flowers.

4. *AMARANTUS GANGETICUS*, Linn.; F. B. I. iv. 719. *A. oleraceus*, Roxb.; Wt. Ic. t. 715.

Most plains Districts, cultivated and run wild.

An erect leafy herb, grown as a spinach (ság). Vern. *Hind.* Lal ság.

Var. *tristis*, Prain. *A. tristis*, Roxb.; Wt. Ic. t. 713.

Many branches from near the base and more frequently cut and used. Cultivated.

5. *AMARANTUS CATURUS*, Heyne; F. B. I. iv. 720.

Deccan, without locality (Heyne).

An erect well-marked plant with thin leaves and long very slender flower-spikes. The utricle may perhaps not be dehiscent circumscissily; it has an elongated neck and slender plumose styles.

6. *AMARANTUS MANGOSTANUS*, Linn.; F. B. I. iv. 720.

Deccan and Carnatic, in most Districts, a weed of roadsides and waste lands, not common.

A diffusely-branched slender herb.

7. *AMARANTUS VIRIDIS*, Linn.; F. B. I. iv. 720. *A. fasciatus*, Roxb.; Wt. Ic. t. 717. *Euxolus caudatus*, Moq.; Wt. Ic. t. 1773.

All plains Districts, a weed of waste places and cultivated land.

An erect glabrous annual, the leaves much used as spinach.

8. *AMARANTUS POLYCAMUS*, Linn.; F. B. I. iv. 721. *A. polygonoides*, Roxb.; Wt. Ic. tt. 512, 719.

All plains Districts, a common weed of waste or cultivated land.

A small annual usually prostrate herb, the leaves often collected and used as spinach.

6. *Cyathula*, Lour.

Herbs or undershrubs. *Leaves* opposite, petioled, entire. *Flowers* small, hermaphrodite, in large or small, bracteate and bracteolate, fascicles with 1—2 perfect flowers and others imperfect, the fascicles in heads, racemes or spikes. *Perianth* of perfect flowers calycine, scarious, 5-lobed, the lobes acuminate or with hooked awns; of imperfect flowers reduced to hooked rigid awns. *Stamens* 5, the filaments connate below in a hypogynous membranous cup, with intervening lacerate or 2—3-fid staminodes; anthers 2-celled. *Ovary* obovoid, 1-celled; ovule solitary, pendulous from a long basal funicle; style simple, filiform; stigma capitellate. *Fruit* an ovoid membranous utricle enclosed in the perianth, its apex areolate. *Seed* oblong, inverse; testa coriaceous; embryo annular; cotyledons linear, flat; radicle erect.

CYATHULA PROSTRATA, Blume; F. B. I. iv. 722. *Desmochoeta prostrata*, DC.; Wt. Ic. t. 733.

Deccan, in Mysore and the Ceded Districts to Coimbatore, up to 3,000 ft.; W. Coast and W. Gháts, S. Canara to Travancore, up to 3,000 ft.

A slender herb, prostrate below and rooting at the nodes, the branches ascending, ending in slender racemes of fascicles of pale violet flowers, the leaves rhomboid or ovate, subacute, up to 2·5 in. long, 1·5 in. broad.

7. *Pupalia*, Juss.

Herbs or undershrubs. *Leaves* opposite, entire, petioled. *Flowers* green, hermaphrodite, fascicled in clusters with 1—2 perfect flowers, the rest imperfect, the clusters rather distant in simple or paniced

spikes; bracts and bracteoles scarious, awned. *Perianth* of perfect flowers calycine, of 5 nearly equal lanceolate acuminate 3—5-nerved lobes, of imperfect flowers reduced to stellately spreading hooked bristles. *Stamens* 5; filaments slender, subulate, shortly combined at the base; anthers 2-celled; staminodes 0. *Ovary* ovoid, 1-celled; ovule 1, pendulous from a long basal funicle; style simple; stigma capitate. *Fruit* an ovoid membranous utricle, enclosed in the perianth, the top areolate. *Seed* inverse, lenticular, rostellate; testa thinly crustaceous; tegmen membranous; embryo annular; cotyledons linear, flat; radicle ascending.

Leaves ovate or elliptic, up to 4 in. long:—

Herbaceous, glabrous or nearly so, annual or biennial; leaves ovate or elliptic-lanceolate, acuminate, up to 4 in. long, 2 in. broad, petioles to .75 in.; hooked bristles purple.....1. *atropurpurea*.
Shrubby, tomentose, perennial; leaves elliptic or ovate, acute or obtuse, often shortly apiculate, base usually rounded, up to 4.5 in. long, 2 in. broad, petioles to .5 in.; hooked bristles yellow.....2. *lappacea*.
Leaves orbicular or broadly obovate, retuse, thick, .75—1.25 in. in diam., decurrent at base to a short petiole; hooked bristles brown.....3. *orbiculata*.

1. *PUPALIA ATROPURPUREA*, Moq.; F. B. I. iv. 723. *Desmochaeta atropurpurea*, DC.; Wt. Ic. t. 731.

N. Circars, common; Deccan, in Coimbatore and to the E. slopes of the Gháts, less so.

A slender herb with long branches, the flower-clusters with loose brownish wool.

2. *PUPALIA LAPPACEA*, Moq.; F. B. I. iv. 724.

N. Circars, Deccan and Carnatic, westwards to the E. slopes of the Gháts.

A large straggling undershrub, the flower-clusters very white woolly.

Var. *velutina*, Hook. f. Densely nearly white-tomentose or velvety, the leaves smaller and usually orbicular—without locality (Wight).

3. *PUPALIA ORBICULATA*, Wt. Ic. t. 1783; F. B. I. iv. 724.

Coromandel Coast, especially near Madras, a sand-binding plant (see H. Cleghorn in 'Madr. Journ.' i.) of the sea beach.

An extensively spreading prostrate plant from a stout woody rootstock, the hooked bristles finally becoming as it were pinnate, the wool loose and white.

8. *Psilotrichum*, Blume.

Herbs or undershrubs. *Leaves* opposite, entire, petioled. *Flowers* white or greenish, hermaphrodite, in axillary, solitary or paniced, spikes or clusters; bracts small, persistent; bracteoles 2, small. *Perianth* calycine, of 5 slightly connate segments, the outer gibbous below, the inner rather smaller. *Stamens* 5; filaments subulate, shortly connate at the base; anthers 2-celled; staminodes 0. *Ovary* oblong or subglobose; ovule 1, pendulous from a long basal funicle; style simple, slender; stigma capitellate or bifid. *Fruit* a globose or compressed utricle, enclosed in the hardened perianth. *Seed* inverse, lenticular; testa coriaceous or crustaceous; embryo annular, enclosing the floury albumen; cotyledons flat; radicle ascending.

Spikes few, in upper axils, .5—1 in. long; perianth .25 in. long, deeply grooved, pubescent; bracts lanceolate, bracteoles ovate, both awned; leaves ovate-lanceolate, or lanceolate-acuminate, narrowed at base, glabrous, up to 3 in. long, 1 in. broad.

1. *nudum*.
Spikes many, in most axils under .5 in. long; perianth .15 in. long, ribbed, with silky wool; bracts ovate acuminate, bracteoles broadly ovate, both awned and villous; leaves ovate or elliptic, acute, rounded at base, glabrous or pubescent to even tomentose, up to 1.5 in. long, nearly 1 in. broad.....1. *calceolatum*.
Spikes 1—3 together, terminal, .5—.75 in. long; perianth .15 in. long, smoothly pubescent, not ribbed, segments mucronate; bracts ovate, mucronate, villous, bracteoles ovate, awned, glabrous; leaves ovate-lanceolate, acute, narrowed at base, scaberulous-villous, 1—1.5 in. long, .5—.75 in. broad.....3. *scleranthum*.

1. *PSILOTRICHUM NUDUM*, Moq.; F. B. I. iv. 724.

Carnatic, chiefly South, about Courtallum (Wight).

A many-branched undershrub.

2. *PSILOTRICHUM CALCEOLATUM*, Moq.; F. B. I. iv. 725. *P. nudum*, Wt. Ic. t. 1775.

Deccan and Carnatic, especially on W. side from Coimbatore to Tinnevely, in hill forests at low levels.

An erect or somewhat climbing undershrub, with many branches.

3. *PSILOTRICHUM SCLERANTHUM*, Thw.; F. B. I. iv. 725.

Travancore (Wight in 'Hb. Edinb.').

A small undershrub with whitish flowers, a Ceylon plant.

9. *Psilostachys*, Hochst.

Slender dichotomous herbs. *Leaves* opposite, petioled. *Flowers* minute, hermaphrodite, in slender spikes, trichotomous at the ends of the filiform branches of a lax panicle. *Perianth* calycine, 5-partite, the 2 or 3 outer lobes strongly 3-nerved, broader than the inner. *Stamens* 5, free; anthers 2-celled; staminodes 0. *Ovary* subglobose or ovoid, 1-celled; ovule solitary; styles slender; stigma capitellate. *Fruit* an indehiscent membranous utricle. *Seed* inverse; testa coriaceous; embryo hooked; cotyledons linear, broader than the ascending radicle.

PSILOSTACHYS SERICEA, Hook. f.; F. B. I. iv. 726. *Achyranthes sericea*, Koenig; Wt. Ic. t. 726.

Locality unknown (Koenig); Coromandel Coast, at Coconada (Gamble), at Kistnapatam, Neilore (Fischer), on the sea coast.

A very pretty slender erect silky herb with broadly ovate leaves up to 1 in. long, .75 in. broad. Bombay (Kathiawar) specimens seem to be more silvery silky than the E. coast ones.

10. *Nothosaerva*, Wight.

An annual herb with opposite spreading branches. *Leaves* opposite. *Flowers* very minute, woolly, hermaphrodite, in axillary, solitary or clustered spikes; bracts hyaline, persistent, bracteoles 2 hyaline. *Perianth* calycine, of 3—5 lobes, the lobes hyaline, obtuse, 1-nerved. *Stamens* usually 2, free; anthers 2-celled; staminodes 0. *Ovary* oblong, compressed; ovule solitary, pendulous from a long funicle; style short; stigma capitellate. *Fruit* a membranous oblong compressed utricle, enclosed in the perianth. *Seed* inverse, lenticular; testa crustaceous; embryo hooked, surrounding floury albumen; cotyledons linear; radicle superior.

NOTHOSAERVA BRACHIATA, Wt. Ic. t. 1776 bis (next No. 1921); F. B. I. iv. 726. *Pseudanthus brachiatus*, Wt. Ic. t. 1776 (*excl. analysis*).
Deccan and Carnatic, in most Districts.

An erect slender herb with very minute white flowers in fascicles of short close spikes, and membranous, ovate elliptic or lanceolate, leaves, usually acute, narrowed at base, up to 1·5 in. long.

11. *Achyranthes*, Linn.

Herbs, sometimes woody below. *Leaves* opposite, entire, petioled. *Flowers* hermaphrodite, in slender simple and paniced spikes, soon deflexed; bracts membranous, spinescent, persistent; bracteoles 2, spinescent. *Perianth* calycine, of 4—5 rigid, lanceolate, aristate segments somewhat connate below, ultimately ribbed and hardened. *Stamens* 2—5; filaments filiform, connate at the membranous base and alternating with as many quadrate staminodes which are toothed lacerate or with a toothed scale at the back; anthers 2-celled. *Ovary* oblong, subcompressed, 1-celled; ovule solitary, pendulous from a long basal funicle; style filiform; stigma capitellate. *Fruit* an oblong or ovoid utricle, rounded or areolate at apex, when ripe usually disarticulating above the bract. *Seed* inverse, oblong; testa coriaceous tegmen membranous; embryo annular, surrounding the floury albumen; cotyledons oblong, again incurved; radicle erect.

Aquatic plant; perianth in fruit much hardened, 3 in. long, the outer segment longer than the rest; bracteoles orbicular; staminodes with a fimbriate dorsal appendage; leaves elliptic-lanceolate, acuminate, pubescent, up to 6 in. long, 1 in. broad.....1. *aquatica*.

Dry ground plants; perianth in fruit somewhat hardened, under 25 in. long, the segments subequal; bracteoles spinous with hyaline wings:—

Wings of the bracteoles broad, nearly half as long as the spine; staminodes truncate, fimbriate, with or without dorsal appendages; leaves very variable

2. *aspera*.
Wings of the bracteoles merely auricles at the base; staminodes truncate, toothed but not fimbriate; leaves variable, elliptic lanceolate or linear, membranous, glabrous or pubescent.....3. *bidentata*.

1. *ACHYRANTHES AQUATICA*, R. Br.; F. B. I. iv. 730. *Centrostachys aquatica*, Wall.; Wt. Ic. t. 1780.

N. Circars, on the margins of rivers and ponds in Ganjam.
A tall rather fleshy water plant, rooting in mud, the stems thick and angular, the spikes sometimes reaching 18 in. long.

2. *ACHYRANTHES ASPERA*, Linn.; F. B. I. IV. 730; Wt. Ic. t. 1777.

All plains Districts, on roadsides and in waste places.
An erect herb reaching 3 ft. in height, with velvety tomentose, orbicular obovate or elliptic, usually obtuse, thick leaves, reaching 4 in. long, 3 in. broad, the slender spikes often reaching 18 in. in fruit, the disarticulating fruit easily adhering to animals or clothing, as in the other species, and so being carried away to be sown elsewhere.

Var. *rubro-fusca*, Hook. f. *A. rubro-fusca*, Wt. Ic. t. 1778. Leaves elliptic-ovate, acute, brown when dry, reddish, with the stems, when fresh. Nilgiri Hills.

Var. *porphyristachya*, Hook. f. Leaves elliptic, acuminate, glabrous or pubescent, membranous, the spikes slender and elongate, the perianth quite .25 in. long, the staminodes with appendages tufted at the back. Nilgiri and Pulney Hills.

3. *ACHYRANTHES BIDENTATA*, Blume; F. B. I. iv. 730; Wt. Ic. t. 1779. W. Ghâts, Nilgiris, Anamalais, Pulneys and hills of Malabar, also Bababudan Hills of Mysore, above 4,000 ft.

An erect herb, the leaves very variable, passing from ovate-lanceolate acuminate, pubescent, about 2 in. long, to lanceolate and finally linear, in some cases up to 8 in. long, 1.5 in. broad and nearly or quite glabrous.

12. *Aerva*, Forsk.

Herbs or undershrubs, erect prostrate or climbing. *Leaves* alternate or opposite or fascicled. *Flowers* hermaphrodite or polygamous, small or minute, in simple or paniced spikes; bracts and 2 bracteoles small. *Perianth* calycine, membranous, 5- rarely 4-lobed, the lobes equal or the outer wider, all or the inner only woolly. *Stamens* 5, rarely 4; filaments subulate, connate with interposed linear staminodes in a hypogynous cup; anthers 2-celled. *Ovary* ovoid or subglobose, 1-celled; ovule pendulous from a long basal funicle; style simple; stigma capitellate or 2-fid. *Fruit* a membranous utricle or a circumscissile capsule with coriaceous apex. *Seed* inverse; testa coriaceous; embryo annular, surrounding the floury albumen; cotyledons linear; radicle superior.

Perianth-lobes 5:—

Spikes axillary or in terminal panicles; leaves opposite or alternate.

Erect; leaves alternate, linear oblong or spatulate, obtuse or acute, densely tomentose, up to 2.5 in. long, about .5 in. broad; flowers dioecious, in densely white-woolly spikes 1—6 in. long forming leafless terminal panicles; stigmas 2, as long as the style.....1. *tomentosa*.

Climbing; leaves alternate and opposite, elliptic-ovate or lanceolate, acute, mucronate, pubescent, up to 4 in. long, 2 in. broad; flowers hermaphrodite, in ovoid or cylindric white-woolly spikes .25—1 in. long, and often in pairs, forming a lax panicle; stigmas very short, capitate.....2. *scandens*.

Spikes all axillary; leaves alternate:—

Erect or prostrate; leaves elliptic obovate or orbicular, obtuse or acute, pubescent above and white-woolly beneath, up to 1 in. long; flowers hermaphrodite or bisexual, minute, in small dense greenish-white heads or spikes, under .5 in. long, often clustered; stigmas 2.....3. *lanata*.

Bushy, prostrate below, then ascending; leaves orbicular or obovate, obtuse, thick, pubescent above, densely white- or slightly tawny-tomentose beneath, up to 2 in. long, 1.5 in. broad; flowers hermaphrodite, small, in small dense yellowish-white spikes .25 in. long, clustered; stigmas 2, short.....4. *Wightii*.

Perianth-lobes 4; spikes cylindrical, peduncled, .5—1 in. long, at the ends of short lateral branches, the flowers bisexual; leaves narrowly linear, opposite or fascicled at the nodes of the branchlets, .25—75 in. long; utricle circumscissile

5. *Monsoniae*.

1. *AERVA TOMENTOSA*, Forsk. *Ae. javanica*, Wt. Ic. t. 876; F. B. I. iv. 727.

Deccan and Carnatic, common.

A very white tomentose conspicuous undershrub. The male flowers seem to be very rare indeed. Perianth-lobes obtuse.

2. *AERVA SCANDENS*, Wall.; F. B. I. iv. 727; Wt. Ic. t. 724 (*exc. utricule and seed*).
N. Circars, Ganjam to Godavari, up to 5,000 ft.; Bababudan Hills of Mysore, at 4,000 ft., on waste land and climbing among bushes.
A straggling undershrub with long branches and silvery-white flower-spikes. Perianth-lobes acuminate.
3. *AERVA LANATA*, Juss.; F. B. I. iv. 728; Wt. Ic. t. 723 (*not good*).
A. floribunda, Wt. Ic. t. 1776 (analysis only), t. 1776 bis A (next t. 1921.)
All plains Districts, and up to about 3,000 ft. in the Hills.
A many-branched undershrub with small flower-spikes and leaves.
4. *AERVA WIGHTII*, Hook. f.; F. B. I. iv. 728.
W. Ghâts, hills about Courtallum and Naterikal, in Tinnevely (Wight, Hb. Madr.)
A many-branched bushy undershrub from a stout root-stock, the leaves thick, the perianth-lobes acuminate and aristate.
5. *AERVA MONSONIAE*, Mart.; F. B. I. iv. 728; Wt. Ic. t. 725.
Deccan and Carnatic, in dry sandy places, both near the Coast and inland, common.
A rather conspicuous and striking plant with a long tap-root, many prostrate or ascending branches and pale pink spikes of crowded flowers reaching up to 1 to 1·5 in. in length.

13. *Alternanthera*, Forsk.

Herbs, usually prostrate. *Leaves* opposite. *Flowers* hermaphrodite, small, white, in axillary often clustered heads, bract and 2 bracteoles scarious. *Perianth* calycine segments 5, unequal, the 2 lateral innermost, concave. *Stamens* 2—5; filaments short, connate in a short cup, with or without intervening staminodes; anthers 1-celled. *Ovary* orbicular or ovoid; ovule solitary, pendulous from a long basal funicle; style short; stigma capitellate. *Fruit* a compressed, ovoid orbicular or obcordate, utricule, the margins thickened or winged. *Seed* inverse, lenticular; testa crustaceous; embryo annular, surrounding the floury albumen; cotyledons narrow; radicle superior.

ALTERNANTHERA TRIANDRA, Lamk. *A. sessilis*, R. Br.; F. B. I. iv. 731; Wt. Ic. t. 727.

All Districts, in wet places, both in the plains and in the hills to over 7,000 ft. It may be found in salt or brackish water as in fresh (Alcock in Ganjam, also Hooper).

A prostrate herb with lanceolate oblanceolate or linear-oblong leaves 1·5—2 in. long, small white flowers in axillary clusters, 3 stamens and a broadly obcordate utricule.

Gomphrena globosa, Linn.; F. B. I. iv. 732; Wt. Ic. t. 1784, is the Globe Amaranth, a tall branched annual with large globose yellowish white or crimson heads of flowers, largely grown in gardens and often found as an escape. It probably came from America. Another species, provisionally identified as *G. decumbens*, Jacq. of Central America, is

found on road-sides about Madras and is reported to be spreading rapidly. *Telanthera ficoidea*, Moq., is a small S. American prostrate plant resembling *Alternanthera* and used in garden-borders as its leaves turn a crimson colour. It is commonly called *Alternanthera amabilis*.

Family CXIX. CHENOPODIACEAE.

Herbs or shrubs, sometimes mealy, sometimes fleshy. *Leaves* usually alternate, simple, exstipulate. *Flowers* small, usually green, hermaphrodite or unisexual, usually regular, often dimorphic; bracts 1 or 0; bracteoles 0 or 2. *Perianth* simple, calycine, of 3—5 simple or connate segments, imbricate in bud. *Stamens* usually 5, opposite the perianth-segments, perigynous or hypogynous, free or connate at the base; anthers 2-celled. *Ovary* ovoid globose or depressed, 1-celled; ovule solitary, basal or lateral, campylotropous; style terminal; stigma capitate 2—3 lobed or stigmas 2—5 free or slightly united. *Fruit* a small utricle, rarely a circumscissile capsule, enclosed in the enlarged sometimes fleshy perianth. *Seed* horizontal or vertical with crustaceous coriaceous or membranous testa; albumen floury, fleshy or 0; embryo curved, annular or spiral.

Stems not twining; bracteoles free from the perianth; anthers erect or incurved in bud:—

Embryo annular or horse-shoe-shaped:—

Stems leafy, not jointed:—

Fruiting perianth not winged; albumen copious:—

Flowers all similar, usually hermaphrodite.....1. *Chenopodium*.

Flowers dimorphic, the ♂ chacteolate with 3—5 perianth-segments, the ♀ 2-bracteolate without perianth.....2. *Atriplex*.

Fruiting perianth with transverse wings; albumen scanty.....3. *Kochia*.

Stems jointed, fleshy; leaves 0:—

Flowers in the scales of cone-like spikes; albumen fleshy...4. *Arthrocnemum*.

Flowers in cavities of successive joints; albumen 0.....5. *Salicornia*.

Embryo spiral, albumen 0:—

Perianth-segments not winged.....6. *Suaeda*.

Perianth-segments transversely winged.....7. *Haloxylon*.

Stems twining; bracteoles 2, adnate to the face of the perianth; anthers versatile; embryo spiral.....8. *Basella*.

1. *Chenopodium*, Linn.

Erect or prostrate herbs. *Leaves* alternate, entire, lobed or toothed. *Flowers* minute, hermaphrodite, in axillary clusters or cymes; bracts and bracteoles none. *Perianth* usually 5-lobed, the lobes concave, incurved. *Stamens* 5 or fewer, hypogynous or almost perigynous; anthers 2-celled. *Disk* 0 or annular. *Ovary* depressed-globose, rarely ovoid; ovule solitary, sessile; stigmas 2—5, sometimes united below in a style. *Fruit* a membranous utricle, enclosed in the perianth. *Seed* usually horizontal; testa crustaceous or coriaceous; embryo nearly or quite annular, surrounding the floury albumen.

An erect scentless herb, green or grey with white granular mealliness; the stems usually striped green or purple; flowers in clusters in paniced spikes; stigmas 2; seeds smooth, shining, somewhat keeled; leaves rhomboid deltoid or lanceolate, entire or lobed.....1. *album*.

A low rather foetid herb, green or with slight granular mealiness; the stems green; flowers in axillary spikes in spreading cymes; stigmas 2; seeds smooth, dull, sharply keeled; leaves rhomboid or deltoid ovate, sharply toothed.....2. *murale*. A tall strongly aromatic glandular herb, pale green; the stems striate, glandular-pubescent; flowers in slender, axillary or terminal, simple or paniced spikes; stigmas 5; seeds smooth, the margins rounded; leaves oblong-lanceolate, sinuate-dentate, the upper entire.....3. *ambrosioides*.

1. *CHENOPODIUM ALBUM*, Linn.; F. B. I. v. 3.

Most plains Districts, also in the Hills, a weed of road-sides, waste lands and cultivated ground. White Goosefoot.

A tall herb sometimes reaching 10 ft., clammy to the touch.

2. *CHENOPODIUM MURALE*, Linn.; F. B. I. v. 4.

Deccan, in Mysore and Coimbatore, probably an introduced weed, but not common.

A low herb, up to about 15 in. high.

3. *CHENOPODIUM AMBROSIODES*, Linn.; F. B. I. v. 4; Wt. Ic. t. 1786.

Deccan and W. Ghâts, up to 7,000 ft., in waste places and on cultivated land, probably not indigenous.

A tall aromatic often gregarious herb with very slender flowering spikes.

2. *Atriplex*, Linn.

Herbs or shrubs, usually mealy. *Leaves* alternate, rarely opposite. *Flowers* small, monoecious or dioecious, in axillary sessile clusters or in simple or paniced spikes; bracts 0, bracteoles in ♂ flowers 0, in ♀ 2, flat, accrescent, dilated in fruit and forming a 2-valved covering to it. *Perianth* in ♂ flower 3—5-partite, calycine, the lobes oblong or obovate, obtuse; in ♀ flowers 0. *Stamens* 3—5, inserted at the base of the perianth; filaments free or connate below; anthers didymous. *Ovary* ovoid or depressed-globose; ovule oblique or vertical; stigmas 2, subulate or filiform, connate below. *Fruit* a membranous utricle, rarely adnate to the seed, enclosed in the enlarged bracteoles. *Seed* erect or inverted, suspended from a long funicle or rarely horizontal; embryo annular, surrounding the floury albumen.

ATRIPLEX REPENS, Roth; F. B. I. v. 7. *Obione Koenigii*, Moq.; Wt. Ic. t. 1790.

E. Coast, from Nellore southwards, on sandy sea-shores.

An undershrub with thick rootstock and long procumbent branches rooting at the nodes, the leaves small, ovate or ovate-oblong, rounded at apex, entire, completely covered with minute white shining scales, up to .75 in. long; bracteoles in fruit thick and usually with warty protuberances on the back.

A. hortensis, Linn.; F. B. I. v. 6. *A. heterantha*, Wt. Ic. t. 1787, is a stout annual often tinged with red, the leaves ovate-lanceolate, the fruiting bracteoles orbicular and reticulate. It is sometimes cultivated as a spinach.

3. *Kochia*, Roth.

Herbs or undershrubs, usually villous or pubescent. *Leaves* alternate, sessile, narrow, entire. *Flowers* minute, axillary, solitary or in

clusters, hermaphrodite and ♀, rarely only ♂; bracts 0. *Perianth* subglobose; lobes 5, incurved, closing over the utricle, girt by 5 free or confluent wings. *Stamens* 5, usually exerted; anthers ovate. *Ovary* depressed-globose; style slender; stigmas 2 or 3, capillary. *Fruit* a membranous depressed utricle. *Seed* ovoid or orbicular, horizontal; testa membranous, embryo annular, the albumen scanty.

KOCHIA INDICA, Wt. Ic. t. 1791; F. B. I. v. 11.

Deccan, in Coimbatore, on salt soils (Wight).

A tall erect branching annual, the small leaves linear-lanceolate, the flowers in much soft brown wool especially round the perianth with its ovate scarious wings.

4. *Anthrocnemum*, Moq.

Fleshy jointed branching shrubs or herbs. *Leaves* 0. *Flowers* very small, hermaphrodite or monoecious (?) in cylindric conelike spikes, in clusters of 3 sunk in the hollows of the joints. *Perianth* calycine, usually 3-4-gonous, minutely toothed at apex, at length spongy. *Stamens* 1-3 (rarely seen, cf. Roxb.). *Ovary* ovoid; ovule 1 suspended on a basal funicle; style short; stigmas 2, subulate. *Fruit* an ovoid utricle, membranous or crustaceous; enclosed in the spongy perianth. *Seed* vertical, ovoid; testa membranous; embryo comma-shaped, partly enclosing the albumen, cotyledons very small, radicle inferior.

Stems prostrate, the branches erect, stout; fruiting spikes 2-25 in. in diam., 5-15 in. long; utricle crustaceous.....1. *indicum*.
Stems erect, the branches ascending, slender; fruiting spikes 1-15 in. in diam., 5-1 in. long; utricle membranous.....2. *fruticosum*.

1. *ANTHROCNEMUM INDICUM*, Moq.; F. B. I. v. 12. *Salicornia indica*, Willd.; Wt. Ic. t. 737.

E. and W. Coasts, in salt marshes.

A prostrate glaucous-green fleshy undershrub with numerous branches.

2. *ANTHROCNEMUM FRUTICOSUM*, Moq.

Var. *glaucum*, Moq. *A. ? glaucum*, Ung. Sternb.; F. B. I. v. 12.

E. Coast, from Madras (at Sadras, Lawson) to Tuticorin (Wight), in salt marshes.

A tall erect many-branched shrub.

5. *Salicornia*, Linn.

Fleshy, jointed, branched shrubs or herbs. *Leaves* 0. *Flowers* minute, hermaphrodite, ternate, in the axils of scaly bracts sunk in superposed and decussately opposite cavities of the internodes, forming cylindric spikes; bracteoles 2. *Perianth* calycine, obpyramidal. *Stamen* 1, anther oblong. *Ovary* ovoid, narrowed to the tip; ovule sessile; stigmas 2, subulate. *Fruit* an ovoid membranous utricle, enclosed in the spongy perianth. *Seed* erect, compressed; testa hispid; albumen 0; embryo conduplicate; radicle inferior, parallel to the cotyledons.

SALICORNIA BRACHIATA, Roxb.; F. B. I. v. 12; Wt. Ic. t. 738.

E. Coast, Chilka Lake in Ganjam, Coasts of Nellore, Chingleput, Tanjore and Tinnevely, in salt marshes.

An erect undershrub, the joints of the branches longer than in those of *Arthrocnemum* and resembling those of some species of *Viscum*. The flower-spikes are very slender.

6. *Suaeda*, Forsk.

Herbs or shrubs. *Leaves* fleshy, terete, rarely flattish. *Flowers* minute, axillary, usually hermaphrodite, rarely bisexual, bracteate and 2-bracteolate. *Perianth* short, calycine, globose or urceolate, 5-lobed or 5-partite, the lobes equal or unequal incurved. *Stamens* 5; filaments short; anthers rather large. *Disk* large or 0. *Ovary* ovoid or orbicular, sessile, adnate below to the perianth, rounded or truncate at the apex; ovule solitary, subsessile; style 0; stigmas subulate, papillose. *Fruit* a small membranous or spongy utricle included in the perianth. Seed erect, horizontal or oblique; testa coriaceous or crustaceous; albumen 0 or scanty; embryo slender, plano-spiral.

Perennial; seed usually erect:—

Flowers hermaphrodite, in dense globose clusters forming long spikes, leafless above; stigma 3; bracteoles with pectinate margins; leaves semiterete, oblong or ellipsoid or linear-obovate, up to .5 in. long, .2 in. broad.....1. *nudiflora*.
Flowers polygamous, in axillary clusters; stigmas 2—5; bracteoles with entire margins; leaves linear, obtuse or subacute, up to 1 in. long, .15 in. broad

2. *monoica*.

Annual; seed usually horizontal; flowers hermaphrodite, in small few-flowered clusters in lax elongate spikes; stigmas 3; bracteoles membranous, entire; leaves narrowly linear, semi-terete, up to 1 in. long, scarcely .1 in. broad.....3. *maritima*.

1. *SUAEDA NUDIFLORA*, Moq.; F. B. I. v. 14. *S. indica*, Moq.; Wt. Ic. t. 1796.

E. Coast, from the Chilka Lake southwards, on the sea coast, common.

A woody undershrub with many branches densely covered with flowers.

2. *SUAEDA MONOICA*, Forsk.; F. B. I. v. 13; Wt. Ic. t. 1792.

E. Coast, from the Kistna river southwards, on the sea coast.

A small erect bush, with many branches.

3. *SUAEDA MARITIMA*, Dumort.; F. B. I. v. 14; *Chenopodina indica*, Wt. Ic. t. 1793.

E. Coast from Madras southwards, on the sea coast, often near salt pans.

An erect slender annual.

7. *Haloxylon*, Bunge.

Shrubs or small trees with opposite jointed branches. *Leaves* opposite, triangular and short or elongate and terete. *Flowers* hermaphrodite, solitary or opposite or 1—3 together in spikes in the axils of ovate bracts; bracteoles 2. *Perianth* calycine, 5-lobed, the lobes concave, accrescent, horizontally winged on the back. *Stamens* 5 or fewer, on the margin or base of a cupular disk with alternating lobes (? staminodes); filaments linear; anthers ellipsoid or hastate. *Fruit* a subglobose or depressed utricle, enclosed in the perianth; stigma 2-lobed or

Seed horizontal; testa membranous; albumen
 equal.

Bunge; F. B. I. v. 15. *Caroxylon indicum*,

ore (Wight).

reaching 3—4 ft. high, turning black when
 old, fleshy, ovate, glabrous, the flowers rather
 conspicuous wings to the perianth-lobes.

8. *Basella*, Linn.

ing fleshy herbs. *Leaves* alternate, entire.
 sessile, spicate; bracts minute, caducous, bract-
 shaped cup, adnate to the perianth. *Perianth*
 lobes short, incurved, later accrescent and
 at the mouth of the perianth-tube; filaments
 stamens versatile. *Ovary* globose; ovule subsessile;
 ovate, papillose within. *Fruit* a globose utricle,
 with pericarp thin, adnate to the seed. *Seed*
 crustaceous; albumen scanty; embryo plano-
 convex, thin, convolute.

F. B. I. v. 20. *B. alba*, Linn.; Wt. Ic. t. 896.
 — cultivated. Indian Spinach.

It is a climbing herb with small white or red
 peduncles often becoming thickened. Leaves
 or acuminate, often cordate at base, up to
 1 d. It is a useful vegetable and makes a good
 salad. Poi; Tel. Batsalla.

the Beet, and *Spinacia oleracea*, Linn., the
 commonly cultivated in gardens. The S. Ameri-
 can *Spinacia*, H. B. & K., is an ornamental climber
 grown in Madras Gardens.

CXX. POLYGONACEAE.

very rarely trees, sometimes climbing. *Leaves*
 entire or serrulate; stipules (ocreae) scarious
 sheathing the stem. *Flowers* hermaphrodite,
 solitary or in small bracteate clusters; pedi-
 cels simple, calycine or corolline, inferior;
 ovate, imbricate in bud. *Stamens* 5—8, rarely
 more than the perianth-segments. *Disk* annular, glan-
 dular; styles 3 or 2, rarely 4; stigma capitate
 a small hard, usually trigonous or biconvex,
 at the base of the styles. *Seed* erect; testa membranous; albu-
 men minute; embryo various; radicle superior.

—pitellate; fruit a compressed or trigonous nutlet
 1. *Polygonum*.
 —triangular; fruit a triquetrous nutlet.....2. *Rumex*.

1. *Polygonum*, Linn.

Herbs or shrubs, rarely climbing. *Leaves* alternate, entire, rarely lobed; stipules membranous, connate in a tubular ocrea. *Flowers* hermaphrodite, small or minute, axillary or terminal, the clusters sessile or in spiciform capitate or paniced racemes; pedicels short, usually jointed under the perianth; bracts and bracteoles membranous, ocreate. *Perianth* green or coloured, 4—5, rarely 3-cleft, the 2 outer segments usually smallest. *Stamens* 5—8, rarely 1—4, perigynous; filaments filiform, often dilated at base or alternate with the lobes of an annular or glandular disk. *Ovary* compressed or trigonous; styles 2 or 3, free or slightly connate; stigmas usually capitellate. *Fruit* a compressed or trigonous nutlet, more or less included in the persistent perianth; pericarp usually hard and often shining. *Seed* albuminous, embryo lateral or excentric; radicle long, cotyledons small.

Flowers in axillary clusters; ocreae tubular, hyaline, lacerate; leaves small, under 1 in. long, usually oblong obovate or linear.....1. *plebejum*.

Inflorescence terminal:—

Inflorescence of sessile or pedicellate flowers in branched spikes or racemes:—

Nutlets biconvex:—

Bracts hispid and ciliate; ocreae .5—1 in. long, tubular, villous and strigose, truncate at mouth and rigidly bristle-ciliate; racemes 1.5—3 in. long, paniculate; leaves lanceolate, acuminate, silky pubescent, up to 8 in. long, 2 in. broad.....2. *tomentosum*.

Bracts small, acute, with long cottony hairs, minutely ciliate on the margins; ocreae up to 1 in. long, tubular, sparsely cottony, truncate at mouth; racemes 1—2 in. long, paniculate, cottony; leaves narrowly lanceolate, acuminate, densely white-cottony beneath, with prominent short nerves, up to 5 or more in. long.....3. *lanigerum*.

Bracts glabrous, ciliate or not:—

Bracts not ciliate on the margins; ocreae .75—1.5 in. long, tubular, glabrous, truncate at mouth, closely embracing the stem till they get torn; racemes slender, 2—4 in. long, paniculate; leaves linear-lanceolate, long acuminate, usually glabrous and gland-dotted, up to 9 in. long, 1.25 in. broad.....4. *glabrum*.

Bracts stiff-ciliate on the margins; ocreae .25—5 in. long, tubular, sparsely long strigose-hairy and ciliate; racemes few, .5—1 in. long, in panicles; leaves linear- or oblong-lanceolate, glabrous except the strigose midrib beneath, up to 2 in. long, .25 in. broad.....5. *minus*.

Nutlets trigonous, sometimes also biconvex on the same plant:—

Racemes stout; bracts closely imbricate, nearly glabrous but short-ciliate on the margins; ocreae .5—1 in. long, tubular, strigose, with very long ciliae at the mouth; leaves lanceolate or linear-lanceolate, acuminate, tapering at base, glabrous except the margins and midrib, up to 6 in. long, 1 in. broad.....6. *barbatum*.

Racemes slender; bracts more or less distant; perianth glandular:—

Ocreae tubular, glabrous, shortly and sparsely ciliate at the mouth; leaves lanceolate, acute, glabrous except the scabrid midrib beneath, up to 3 in. long, .75 in. broad; nutlets both trigonous and plano-convex.....7. *Hydropiper*.

Ocreae tubular, strigosely hispid, long-ciliate at the mouth; leaves lanceolate or elliptic lanceolate, acuminate, strigosely hairy beneath, up to 6 in. long, 1 in. broad.....8. *flaccidum*.

Inflorescence capitate, the heads single or in corymbs:—

Heads pedunculate, small, sessile in the axil of an involucre leaf; bracts ovate-oblong, membranous; perianth 4-fid; nutlets biconvex or subtrigonous, minutely pitted in lines; leaves deltoid-ovate, entire, acute, truncate or subcordate at base and decurrent as wings to the amplexicaul petiole, up to 2.5 in. long, 1 in. broad; ocreae membranous, obliquely truncate, hairy at base.....9. *punctatum*.

Heads pedunculate, without an immediate involucre leaf:—

Stems without prickles at the nodes; heads small, about .25 in. in diam., much bracteate, perianth 5-fid:—

Heads usually in pairs on glandular hispid peduncles; bracts ovate, acute, glabrous, chaffy; nutlets flat or trigonous; leaves deltoid-ovate, acute, ciliate, truncate or subcordate at base and shortly decurrent, up to 3 in. long, 2 in. broad; ocreae tubular below, split at the mouth, truncate, strigose and strigosely ciliate.....10. *sphaerocephalum*.

Heads in corymbose terminal panicles, the peduncles glandular hairy; bracts ovate, acute, glabrous; nutlets trigonous; leaves elliptic or ovate, acute or shortly acuminate, the margins entire or crenulate, the petiole auricled, up to 6 in. long, 3 in. broad; ocreae long, membranous, obliquely cleft, acuminate, and often much split when old.....11. *chinense*.

Stems more or less covered with retrorse prickles at the nodes, also on the midrib on the under-surface of the leaves; bracts ovate, acuminate, strigose and ciliate; heads elongate in short oblong racemes:—

Leaves oblong-lanceolate, acuminate, cordate or hastate at base, prominently prickly on the midrib beneath, up to 3 in. long, 1 in. broad; ocreae tubular, strigose and long ciliate, prickly at base.....12. *strigosum*.

Leaves linear or linear-lanceolate, acuminate, narrowed at base, not prominently but sparsely prickly on the midrib beneath, up to 6 in. long, 1 in. broad; ocreae tubular, oblique at mouth, glabrous, shortly ciliate, slightly prickly at base.....13. *pedunculare*.

1. *POLYGONUM PIEBEJUM*, R. Br.; F. B. I. v. 27, *P. indicum*, Heyne; Wt. Ic. t. 1808.

All plains Districts and up to 5,000 ft. in the hills.

A prostrate herb, usually from a woody rootstock, the branches flat, the flowers pink, the leaves small, usually, in this area, linear or obovate, up to .5 in. long (var. *indica*, Hook. f.) but often much smaller and sometimes longer and more linear.

Var. *Miqueliana*, Hook. f. Stems flexuous; leaves obovate, obtuse; flowers with long (.15—2 in.) pedicels. S. Canara (Hohenacker). The var. *polyneura*, Hook. f., seems to be the same but with shorter pedicels, longer leaves and the ocreae larger and nerved. S. Canara (Hohenacker).

2. *POLYGONUM TOMENTOSUM*, Willd.; F. B. I. v. 30.

N. Circars, Deccan and Carnatic, in ditches and other wet places.

A stout thick herbaceous plant with prostrate stems rooting at the nodes, the branches erect, thick and very hairy, the flowers large and white, the nutlets large, thick, crustaceous and shining, dark brown.

3. *POLYGONUM LANIGERUM*, R. Br.; F. B. I. v. 35.

Deccan, Geddesala in Coimbatore at 4,000 ft. (Fischer).

A stout herb, procumbent and creeping below, the branches erect, the flowers small, red or white, the nuts flat and shining; at once recognized by the white cottony wool.

4. *POLYGONUM GLABRUM*, Willd.; F. B. I. v. 34; Wt. Ic. t. 1797.

N. Circars, Deccan and Carnatic, South to S. Travancore, also E. side of W. Ghâts, up to 5,000 ft. in hilly country, in ditches and wet places.

An erect glabrous annual herb, reaching even 5 ft. in height, rooting from lower nodes, the flowers pink or white, the leaves very slender.

Var. *scabrinerve*, Hook. f. Leaves shorter, scabrid on the midrib beneath; racemes shorter and more closely paniced. W. Gháts, Pulney Hills at about 6,000 ft.

5. *POLYGONUM MINUS*, Huds.; F. B. I. v. 36. *P. strictum*, All.; Wt. Ic. t. 1800.

W. Gháts, Nilgiris and Pulneys, at 5,000—7,000 ft. in bogs and other wet places.

A low herb, creeping and rooting at the nodes, the racemes and leaves small, the small flowers pink.

6. *POLYGONUM BARBATUM*, Linn.; F. B. I. v. 37; Wt. Ic. t. 1798.

N. Circars, Deccan and Carnatic, in wet places.

An erect annual, conspicuous for the long fimbriate ciliae of the ocreae, the flowers white, the leaves lanceolate.

7. *POLYGONUM HYDROPIPER*, Linn.; F. B. I. v. 39.

W. Gháts, Anamalai and Pulney Hills, in wet places up to 6,000 ft.

A stout glabrous but often glandular annual with pink flowers.

8. *POLYGONUM FLACIDUM*, Meissn.; F. B. I. v. 39. *P. Donii*, Wt. Ic. t. 1801.

N. Circars and Deccan, in wet places in hill forests, also W. Gháts, Nilgiris and Pulneys, up to 6,000 ft.

A rather slender herb, with very long filiform flaccid racemes of usually pink flowers.

9. *POLYGONUM PUNCTATUM*, Buch.-Ham. *P. alatum*, Buch.-Ham.; F. B. I. v. 41. *P. nepalense*, Meissn.; Wt. Ic. t. 1804.

N. Circars, Mahendragiri Hill, Ganjam, 4,000 ft.; hills of the Deccan and Carnatic, usually above 4,000 ft.; W. Gháts, Nilgiris and Pulneys, above 4,000 ft., a weed in gardens and cultivated land.

A small, more or less procumbent annual, the flowers white or pink.

Var. *Metzianum*, Hook. f. Small and diffusely branched with small leaves and heads, the nutlet biconvex or trigonous. Coorg (Hohenacker), Pulney Hills, above 6,000 ft. (Saulière).

10. *POLYGONUM SPHAEROCEPHALUM*, Wall.; F. B. I. v. 43. *P. Wallichii*, Wt. Ic. t. 1805.

W. Gháts, Nilgiris, above 7,000 ft., especially on Doddabetta (Gamble, Lawson).

A somewhat creeping herb. The leaves are larger than in North Indian specimens.

11. *POLYGONUM CHINENSE*, Linn.; F. B. I. v. 44; Wt. Ic. t. 1806.

N. Circars, Mahendragiri Hill in Ganjam (Fischer); Deccan and Carnatic, in the hills, scarce; W. Gháts, in all Districts above 3,000 ft., common.

A rambling undershrub, semi-scandent over bushes, with white or pink flowers, variable in shape and size of leaf, the large elliptic ones (var. *ovalifolium*) perhaps the most common.

12. *POLYGONUM STRIGOSUM*, R. Br.; F. B. I. v. 47. *P. horridum*, Buch.-Ham.; Wt. Ic. t. 1803.

W. Gháts, Nilgiri and Pulney Hills, above 5,000 ft., in wet places.

A herbaceous plant with pink flowers, the nutlets trigonous, the stems at first decumbent and rooting, the branches erect.

13. *POLYGONUM PEDUNCULARE*, Wall. ; F. B. I. v. 48; Wt. Ic. t. 1802 C. W. Gháts, Pulney Hills.

A glabrous erect herb with lanceolate acute leaves up to 3 in. long, 1 in. broad, the heads very small, in slender dichotomous glandular cymes.

Var. *nilagiricum*, Hook. f. Leaves, linear-oblong or oblong-lanceolate, up to 6 in. long, .75—1 in. broad, the stems glabrous, the heads rather large. Nilgiri Hills, at 6,000 ft. (C. B. Clarke).

Var. *robustum*, Hook. f. Leaves linear-lanceolate, acuminate at both ends, up to 6 in. long, .75 in. broad, the stems scabrid, the heads rather large (Wt. Ic. t. 1802 B).

Var. *angustissimum*, Hook. f. Leaves narrowly linear up to 5 in. long, .3 in. broad, the stems nearly smooth, the heads often subcylindric (Wt. Ic. t. 1802 A). Nilgiri Hills at 6,000 ft.

P. molle, D. Don, is a shrubby species of the E. Himalaya, cultivated and now run wild in the higher Nilgiri Hills.

2. *Rumex*, Linn.

Annual or perennial herbs, rarely shrubs. *Leaves* various, mostly radical or cauline, alternate; stipules hyaline, ocreate, often disappearing with age. *Flowers* hermaphrodite monoecious or dioecious, in axillary clusters or in whorls arranged in simple or paniced racemes; pedicels jointed; bracts ocreate; bracteoles 0. *Perianth* simple, calycine; segments 6, rarely 4, the inner accrescent, entire or toothed, the midrib often enlarged or tubercled. *Stamens* 6; filaments short; anthers oblong. *Ovary* trigonous; ovule solitary; styles 3; stigmas fimbriate. *Fruit* a small nut, enclosed in the usually enlarged inner perianth-segments, the angles acute. *Seed* erect; embryo lateral, nearly straight; cotyledons linear or oblong.

Flowers hermaphrodite; stout herbs; inner perianth-segments coriaceous in fruit:—

Inner perianth-segments lanceolate, acute, entire or with few teeth, a very conspicuous oblong tubercle on the back; leaves oblong panduriform, obtuse, cordate at base, the margins waved or crisped, up to 8 in. long, 1.5 in. broad

1. *nigricans*.

Inner perianth-segments orbicular-ovate, reticulate, the margins with many teeth with hooked tips, one or more with a rather small tubercle on the back; leaves oblong- or triangular-ovate, acute or obtuse, cordate at base, up to 14 in. long, 5 in. broad.....2. *nepalensis*.

Flowers monoecious; fleshy herbs; inner perianth-segments membranous and reticulate in fruit; leaves elliptic or oblong, cordate or hastate at base.....*vesicarius*.
Flowers dioecious; slender herbs; inner perianth-segments very small, oblong, closely appressed to the nut in fruit; leaves small, lanceolate or hastate.....*Asetosella*.

1. *RUMEX NIGRICANS*, Hook. f.; F. B. I. v. 59.

N. Circars, on the Godavari (Gamble).

An erect stout annual herb reaching 1.5 ft. high, the stem grooved, the leaves with long slender petioles. The inflorescence is black when dry or nearly so.

2. *RUMEX NEPALENSIS*, Spreng.; F. B. I. v. 60; Wt. Ic. t. 1810.

W. Gháts, Nilgiri and Pulney Hills, above 6,000 ft.

A tall stout annual or perennial herb, sometimes with tuberous roots, the stems grooved, the leaves long-petioled.

R. vesicarius, Linn., is an annual herb, wild in the W. Himalayas elsewhere cultivated as a vegetable. It is at once recognized by the membranous pink or white reticulate inner fruiting perianth.

R. Acetosella, Linn., is a European common herb, the Sheep Sorrel, introduced and now run wild in the Nilgiris.

Fagopyrum esculentum, Moench., is the Buckwheat, occasionally grown as a grain crop in the hills. *Antigonon leptopus*, Hook. & Arn., is the Coral Creeper, a large handsome climbing shrub with pink flowers, a native of S. America and commonly grown in Indian gardens. *Muehlenbeckia platyclados*, Meissn., is a glabrous erect shrub, native of the Solomon Islands and often grown in Indian gardens. It has smooth flattened leaf-like branches and small flowers in lateral fascicles.

Family CXXI. PODOSTEMONACEAE.

After J. C. Willis in the 'Annals of the Royal Botanic Gardens, Peradeniya, Ceylon,' vol. i, pp. 181 and 267 (1902), with plates.

Aquatic herbs, usually annual, submerged and closely attached to rocks, the flowers appearing and the seeds germinating at the close of the rainy season when exposed by the fall of the water-level. Primary axis early giving rise to a *thallus*—the part of the plant that creeps on the rocks or lies near to them. Secondary shoots appear from the thallus, and may be found as rosettes of leaves or as growing or branching leaf-bearing axes. *Leaves* very simple and delicate (easily lost), changing to bracts and finally ending in a *spathe* or cupule which encloses the young flower. *Flowers* hermaphrodite, small, regular and trimerous with a perianth or zygomorphic and bimerous without one. *Stamens* hypogynous, in regular flowers 3, alternate with the perianth-segments, in zygomorphic flowers usually 2, monadelphous and usually with 2 staminodes; anthers introrse, 2-celled. *Ovary* superior, 2—3-celled, with thick placenta and delicate septa; ovules numerous, anatropous; stigmas 2—3. *Fruit* a usually pedicellate capsule, ribbed or smooth, septifragal. *Seeds* usually numerous, minute (in *Farmeria* 2 or 4); testa mucilaginous; albumen 0; embryo straight.

Flowers regular; perianth of 3 segments; stamens 3:—

Thallus a thread-like creeping root; secondary shoots long, complexly branched, freely floating, bearing ramuli or moss-like shoots of limited growth; floral axis subtended by few leaves, sometimes slightly connate.....1. *Tristicha*.

Thallus frondose, foliiferous, creeping, closely attached to rocks; secondary shoots of small rosettes of leaves on upper side of thallus; floral shoots arising from axial cupules.....2. *Lawia*.

Flowers zygomorphic, naked; stamens 1—3:—

Fruit ribbed, iso- or aniso-lobous, dehiscent, with many seeds; spathe erect, more or less cylindrical, opening at apex by several teeth:—

Thallus fucoid or dimorphic, usually freely floating; secondary shoots 1-flowered with scaly bracts; fruit isolobous.....3. *Dicraea*.

Thallus thread- or ribbon-like, creeping; secondary shoots erect with several flowers; bracts ditheous, not scaly; fruit anisolobous.....4. *Podostemon*.

Fruit smooth, anisolobous, dehiscent, with many seeds; spathe erect, toothed or bifid:—

Thallus fucoid or attached and closely creeping; secondary shoots small, with distichous leaves.....5. *Griffithella*.

Thallus crustaceous, attached to rock; secondary shoots large, erect, with 4-ranked leaves; spathe bilobed at tip.....6. *Willisia*.

Fruit ribbed, iso- or aniso-lobous, dehiscent, or smooth aniso-lobous, dehiscent or indehiscent, with many or few seeds; spathes more or less prostrate, splitting along the upper side; thallus closely attached to rock:—

Thallus crustaceous or ribbon-like, exogenously lobed or branched; secondary shoots usually prostrate when floriferous, 1-flowered with small scaly bracts; seeds very many, fruit dehiscent, iso- or aniso-lobous, ribbed or smooth

7. *Hydrobryum*.

Thallus ribbon-like, endogenously branched; secondary shoots as in *Hydrobryum* but behind the branches of thallus; seeds 2—4, fruit dehiscent or not, ribbed or not.....8. *Farmeria*.

1. *Tristicha*, Dup.-Th.

Submerged herbs with the habit of *Fontinalis* and other aquatic mosses, the roots creeping, filamentous, attached by feet; secondary shoots very many, often more or less paired on opposite sides, floating freely in the water. When most developed often long, many-flowered and frequently branched, but often quite short, unbranched and 1-flowered or vegetative only; branches of 2 kinds, long ones with the structure of the main axis and short ones consisting of a delicate axis with very many small leaves often tristichous. *Flowers* terminal, on pedicels subtended by 2—3 large or several ordinary leaves, the upper ones often more or less united; pedicel and ovary with deciduous cortex, which shrivels after flowering, the small flowers usually emerging through the water at the beginning of the dry season.

TRISTICHA RAMOSISSIMA, Willis. *Terniola ramosissima*, Wedd.; F. B. I. v. 63. *Dalzellia ramosissima*, Wt. Ic. t. 1920, f. 1.

W. Ghâts, rivers of S. Canara, Malabar, Cochin and Travancore (Johnson, Bourdillon, etc.), also Anamalai Hills, up to 4,000 ft.

A floating plant with very long filiform much-branched stems, narrowly linear leaves in tufts round the single pedicellate flower, which has 3 stamens and 3 long filamentous hairy stigmas. Branchlets not tristichous.

2. *Lawia*, Griff.

Herbs with frondose thalli, living on smooth rocks in rapids and waterfalls, submerged during the S.W. monsoon, flowering in the dry season when exposed. *Thallus* closely attached to the rock, suborbicular or stellate, attached by root-hairs, usually much branched with ribbon-like or flabelliform lobes. *Leaves* very numerous, simple, entire, usually acute, green or red, occurring either on the upper surface and edges of the thallus or in closely-packed rosettes on its older parts. *Flowers* terminal on the growing points of the margins of the thallus, rarely on the upper surface, solitary, on pedicels emerging from terminal axial leafy cupules; pedicel in flowering time 1—2.5 in. long, covered, as also the ovary, with a pellucid cellular cortex, which falls off after flowering, leaving an elastic pedicel up to 1.25 in. long, erect.

Stamens 3, alternating with the perianth-segments; anthers 2-celled, opening longitudinally. *Capsule* ellipsoid or obovoid, 9-ribbed, 3-celled, septifragal, valves incurved after dehiscence.

LAWIA ZEYLANICA, Tul. *Terniola zeylanica*, Tul.; F. B. I. v. 62. Var. *malabarica*, Willis.

W. Ghâts, S. Canara, at Sullia and Beltangadi (Barber); Tambra-
parni River in Tinnevely (Barber).

A frondose plant with thallus closely adhering and branching
the fruiting pedicel about 3 in. long, the fruit obovoid-elliptical.

3. *Dicraea*, Tul.

Submerged herbs with the habit of *Fucus* and other seaweeds. *Thallus* various, usually freely floating from an attached base, exogenously branched, with marginal ultimately 1-flowered secondary shoots; leaves usually subulate. *Flowers* zygomorphic, enclosed in spathes splitting irregularly at the tip and subtended by 2—8, usually 4, fleshy scaly bracts. *Stamens* 2 or 1, with staminodes on either side of the common axis. *Ovary* smooth, ripening to a 8- or rarely 8—12-ribbed isolobous fruit with very many seeds.

Thallus narrow, ribbon-like, flattened, attached at base, freely floating above, up to 1 ft. long; pedicels about .75 in. long.....1. *dichotoma*.

Thallus broad, algiform, freely branched, creeping or floating from an attached base, up to 1.5 ft. long; pedicels up to 1.5 in. long.....2. *stylosa*.

1. DICRAEA DICHOTOMA, Tul.; Wt. Ic. t. 1916, f. 2. *D. Wightii*, Tul.; Wt. Ic. t. 1916, f. 3. *D. longifolia*, Wt. Ic. t. 1916, f. 4. *D. rigida*, Wt. Ic. t. 1916, f. 5. *Podostemon dichotomus*, Gardn.; F. B. I. v. 64.

W. Ghâts, Nilgiris and Malabar Hills, up to 8,000 ft., on rocks in rapids.

Thallus narrow, usually zigzag, the leaves filiform.

2. DICRAEA STYLOSA, Wt. Ic. t. 1917, f. 2. *D. algaeformis*, Bedd.; Trans. Linn. Soc. xxv. t. 24. *Podostemon stylosus*, Benth.; F. B. I. v. 64. *P. algaeformis*, Benth.; F. B. I. v. 65.

W. Ghâts, S. Canara to Travancore, Nilgiris and Anamalais, up to 5,000 ft.

Thallus broad, seaweed-like, the bracts helmet-shaped.

4. *Podostemon*, Michx.

Herbs of eddies and rapids, in mountain streams. *Thallus* thread- or ribbon-like; secondary shoots ascending, several-flowered, with long subulate leaves and no scaly bracts. *Flowers* zygomorphic, naked, terminal with a tubular or funnel-shaped erect spathe rupturing irregularly at the tip. *Stamens* 2 or 1, monadelphous, with a staminode at each side of the common axis, and sometimes at the fork of the partial filaments. *Ovary* ellipsoid; stigmas 2, simple, subulate, with small papillae. *Fruit* unequally lobed, 8-ribbed, one valve persistent with 3 decurrent ribs, the other deciduous.

Stamens usually 2; flowers not cleistogamic; ovary not winged.....1. *subulatus*.
Stamen 1; flowers cleistogamic; ovary with 6 broad wings.....2. *Barberi*.

1. *PODOSTEMON SUBULATUS*, Gardn. ; F. B. I. v. 65 ; Wt. Ic. t. 1918, 1.
W. Gháts, Anamalai Hills, on the Monica Estate at 3,500 ft.
(Willis, Barber).
Easily recognized by the long slender subulate leaves, attached to the rocks in tufts and sheathing at base.
2. *PODOSTEMON BARBERI*, Willis.
W. Gháts, hills of S. Canara, at Beltangadi (Barber).
A little-known species, with broad thallus, closely attached to the rock, the spathe very long, the fruit pedicel upto .8 in. long.

5. *Griffithella*, Warming.

Minute herb attached to rocks in running streams. *Thallus* algiform, very polymorphous ; secondary shoots marginal or on central parts, small with included axis in vegetative condition, ultimately slightly exserted. *Leaves* distichous. *Flowers* naked, zygomorphic, emerging from an erect or ascending tubular or funnel-shaped spathe irregularly split at the tip. *Stamens* 2, monadelphous ; staminodes 2, at the sides of the filament-sheath. *Ovary* very oblique ; stigmas 2, simple, subulate or more or less lobed, with small papillae. *Capsule* quite smooth, nearly spherical, unequally lobed, splitting obliquely into a larger persistent and smaller deciduous lobe.

GRIFFITHELLA HOOKERIANA, Warming. *Podostemon Hookerianus*, Wedd. ; F. B. I. v. 65. *Mniopsis Hookeriana*, Tul. ; Wt. Ic. t. 1918, f. 4.

W. Gháts, in S. Canara at Beltangadi and Sullia (Barber).
A curious lichen-like plant. The S. Canara plants belong to the var. *G. Willisiana*, Warming, characterized by a short spathe and toothed or fimbriate stigmas, the fruiting pedicels .1—6 in. long.

6. *Willisia*, Warming.

Small tufted herbs with erect imbricate shoots. *Thallus* small, crustaceous, fleshy, closely attached to the rock ; secondary shoots crowded, erect, forming a dense tuft, the shoots with imbricate scaly leaves ; in addition, during the vegetative season one or more shoots are found with leaves not imbricate but long and filiform and non-floriferous. *Leaves* of floriferous shoots decussate and triquetrous. *Flowers* naked, zygomorphic, sessile, terminal, the spathes bifid at tip. *Stamens* 2, monadelphous, with two staminodes. *Ovary* ellipsoid ; stigmas 2, subulate, smooth. *Capsule* smooth, with a slight rib in the centre of each valve, anisolobous, one valve deciduous, the other persistent on a bifid stalk, when the non-vascular tissues fall away.

WILLISIA SELAGINOIDES, Warming. *Mniopsis selaginoides*, Bedd. ; Trans. Linn. Soc. xxv. t. 28. *Podostemon selaginoides*, Benth. ; F. B. I. v. 58.

W. Gháts, Anamalais to 3,500 ft. (Beddome, Wight, Barber, Willis).

A very curious species with shoots resembling *Lycopodium Selago*, attached in tufts to the thallus on rocks.

7. *Hydrobryum*, Endl.

Small green herbaceous plants closely attached to rocks. *Thallus* crustaceous or branched; secondary shoots marginal with 3—8 bracts, usually prostrate. *Leaves* simple, subulate. *Flowers* zygomorphic, stalked or sessile, emerging from a boat-shaped spathe splitting mainly along the upper side. *Stamens* 2 or 1, equalling or exceeding the ovary, staminodes linear. *Ovary* subglobose, 2-celled; stigmas 2, rather large, subulate or lobed or dentate, sometimes obtuse, entire or lacerate. *Fruit* small, sessile or stalked, smooth or 8—12-ribbed, isolobous or anisolobous with numerous seeds.

Fruit sessile, smooth, thallus branched.....1. *sessile*.
Fruit stalked, 8-ribbed:—

Thallus crustaceous, stamens short.....2. *olivaceum*.

Thallus crustaceous, stamens very long.....3. *Johnsonii*.

Thallus ribbon-like, branched, stamens of varying length.....4. *lichenoides*.

1. *HYDROBRYUM* SESSILE, Willis.

W. Gháts, streams of S. Canara, at Beltangadi (Barber).

A curious little plant with distichous bracts bearing the sessile fruit.

2. *HYDROBRYUM* OLIVACEUM, Tul.; Wt. Ic. t. 1918, f. 2. *H. griseum*, Tul.; Wt. Ic. t. 1918, f. 3. *Podostemon olivaceus*, Gardn.; F. B. I. v. 66.

W. Gháts, Anamalai Hills, at 3,500 ft. (Barber, Willis), form *anamalaiense*; Nilgiris, Pykara River at 5,000—6,000 ft. (Gardner, Brandis, Willis), form *griseum*.

A common very small species "easily distinguishable by its crustaceous thallus and erect clearly-ribbed fruit."

3. *HYDROBRYUM* JOHNSONII, Willis. *Mniopsis Johnsonii*, Wt. Ic. t. 1918, f. 5. *Podostemon Johnsonii*, Wedd.; F. B. I. v. 66.

W. Gháts, mountain streams in Malabar (Johnson).

4. *HYDROBRYUM* LICHENOIDES, Kurz. *Podostemon acuminatus*, Wedd.; F. B. I. v. 66. *P. microcarpus*, Wedd.; F. B. I. v. 66.

W. Gháts, streams of S. Canara (Barber), form *Kanarensis*; Anamalai Hills, at 3,500 ft. (Willis), form *Fentonii*.

The most common, but also the most variable species.

8. *Farmeria*, Willis.

Dendritically-branching herbs, adherent to smooth rocks in eddies and rapids. *Thallus* ribbon-like, closely attached, regularly branched; secondary shoots as in *Hydrobryum* but behind the branches of thallus instead of in anterior axils. *Bracts* prostrate, thicker on upper side, usually about 6, scaly, with deciduous tips; spathe as in *Hydrobryum*, splitting on upper side. *Stamen* 1 usually. *Ovary* more or less globose, with thickened placenta and 2—4 ovules on the under-side; lower loculus more or less abortive; stigmas large, subulate. *Fruit* small, the upper lobe larger, 2—4-seeded.

FARMERIA INDICA, Willis.

W. Gháts, Tambraparni river, near Tinnevely (Barber).

A small species with thread-like thallus and ribbed, dehiscent, shortly stalked, 4-seeded fruits.

Family CXXII. ARISTOLOCHIACEAE.

Herbs or shrubs, often climbing, usually with more or less unpleasant odour. *Leaves* alternate, petioled, entire or lobed; stipules 0. *Flowers* hermaphrodite, often large, usually lurid; terminal axillary or lateral, solitary racemose or cymose; bracts various, often 0. *Perianth* simple, corolline, superior, regular or irregular, 3-lobed or tubular and variously shaped; lobes valvate. *Stamens* 6 or more, adnate in 1 or 2 series to the style-column; anther-cells parallel, extrorse, opening dorsally. *Ovary* 4—6-celled; placenta parietal, free or meeting at the axis; ovules numerous, anatropous; style columnar, ending in stigmatic lobes. *Fruit* a capsule or berry. *Seeds* numerous, horizontal or pendulous; albumen fleshy, copious; embryo minute.

Shrubs; perianth regular, equally 3-lobed; capsule elongate; leaves ribbed and reticulate.....1. *Apama*.

Trailing or climbing herbs or shrubs; perianth irregular, tubular with an inflated base and 2-lipped limb; capsule septicidally 6-valved; leaves various or pitted.....2. *Aristolochia*.

1. *Apama*, Lamk.

Shrubs or undershrubs, often with stellate hairs. *Leaves* alternate, petiolate, 3—5-ribbed at the base, the ribs often extending beyond the middle, nerves and reticulation prominent. *Flowers* in axillary terminal or subradical bracteate cymes. *Perianth* shortly campanulate, 3-lobed, the lobes valvate. *Stamens* 6—12, 1-seriate, free or connate near the base; anthers extrorse, the cells parallel, the connective thick and sometimes produced. *Ovary* inferior, elongate, 4-celled; style-column thick; stigmas 3 or more, linear; ovules numerous, uniseriate in vertical rows from the axis, pendulous. *Fruit* an elongate, 4-gonous, septicidally 4-valved capsule. *Seeds* many, oblong, trigonous, rugose or pitted; albumen fleshy; embryo minute.

Leaf with the ribs next to the midrib prominent and reaching nearly three-quarters of the way up, nerves 3—4 pairs from the midrib; perianth-lobes sub-orbicular, slightly acute at apex; anthers in 3 groups of 3, the connectives shortly apiculate; style column short, the stigmas longer.....1. *siliquosa*.
Leaf with the ribs next to the midrib like the nerves, scarcely reaching halfway up, nerves from the midrib 6—10 pairs, joining in arches; perianth-lobes obovate, abruptly apiculate; anthers free with slender filaments, the connective produced in a triangular apiculus; style-column long, the stigmas about as long...2. *Barberi*.

1. *APAMA SILIQUOSA*, Lamk. *Bragantia Wallichii*, R. Br.; F. B. I. v. 73; Wt. Ic. t. 520.

W. Gháts, in all Districts, in evergreen forest undergrowth, up to 4,000 ft.

An erect shrub with grey bark, the very reticulate distichous leaves oblong lanceolate or oblanceolate, long-acuminate, up to 9 in. long 2.5 in. broad, the erect capsules up to 4 in. long.

2. *APAMA BARBERI*, Gamble in Kew Bull. 1924, 386.

W. Gháts, Kannikatti in Tinnevely (Barber).

A shrub with branches covered with long corky lenticels, the leaves lanceolate, acuminate, with shorter side ribs and many more nerves than the former species, up to 8 in. long, 2 in. broad.

2. *Aristolochia*, Linn.

Shrubs or perennial herbs, prostrate or climbing. *Leaves* alternate, entire or lobed, often with a stipule-like leaf of an undeveloped bud in the axil; petiole dilated at base. *Flowers* solitary or fascicled or racemose in the leaf-axils; bracts often rather large. *Perianth* very variable in shape, size and colour, the tube inflated below, then contracted in a cylindrical neck, then expanded in a dilated oblique usually 2-lipped limb. *Stamens* usually 6, adnate to and around the style-column; anther-cells 2, extrorse. *Ovary* inferior, more or less 6-celled; placenta parietal or intruded or connate in the axis; ovules very many, 2-seriate; style-column thick, divided above the anthers in a 3—6-lobed stigmatiferous disk. *Fruit* a septicidal capsule, 6-valved or splitting through the placentas. *Seeds* numerous, horizontal, often covered in part with the remains of the placenta; albumen fleshy; embryo minute, close to the hilum.

Stems prostrate; leaves glaucous, reniform or broadly ovate, cordate at base with a wide sinus, up to 3 in. in diam.; flowers solitary with a large orbicular bract, tube and limb 1—1·75 in. long; stigmatic lobes glandular hairy; seeds flattened but thickened, one side completely covered with round glands, ·2 in. long

1. *bracteata*.

Stems twining; leaves green; flowers in racemes with small bracts; seeds winged:—
Leaves very variable, linear to obovate-oblong or subpanduriform, rounded or slightly cordate at base, up to 6 in. long, 3 in. broad; tube and limb of perianth 1·5 in. long; stigmatic lobes incurved; seeds flattened, thin, broadly winged, glands only opposite the cotyledons, ·3 in. long.....2. *indica*.
Leaves large, ovate, acute or acuminate, deeply cordate with a deep but narrow sinus, the upper lanceolate, up to 8 in. long, 4·5 in. broad; tube and limb of perianth 1—1·5 in. long; stigmatic lobes in a cone; seeds flattened, broadly winged, glands only in the middle, ·3 in. long.....3. *Tagala*.

1. *ARISTOLOCHIA BRACTEATA*, Retz; F. B. I. v. 75.

N. Circars, Deccan and Carnatic, on dry soils, especially black-cotton.

A perennial herb with greenish tube and dark purple lip to the perianth, which is linear with revolute margins, the capsule about ·75 in. long, oblong-ellipsoid, 12-ribbed. A nauseously bitter plant, used as an anthelmintic. Vern. *Hind*. Kiramar; *Ur*. Paniri.

2. *ARISTOLOCHIA INDICA*, Linn.; F. B. I. v. 75. *A. lanceolata*, Wall.; Wt. Ic. t. 1858.

All Districts, at low levels, on hedges and among bushes.

A perennial twiner with greenish-white tube, the lip darker and oblong, the capsules 1·5—2 in. long, ribbed. A bitter plant like the former, said to be an antidote to snake-bite. Vern. *Hind*, Isharnal; *Tel*. Isara.

3. *ARISTOLOCHIA TAGALA*, Cham. *A. Roxburghiana*, Klotzsch; F. B. I. v. 75. *A. acuminata*, Roxb.; Wt. Ic. t. 771.

W. Ghâts, S. Canara and Mysore to Tinnevely, at rather low levels and chiefly on the E. side.

A climbing shrub with greenish-yellow tube and purple-brown lip to the flowers, the capsule very variable in size, up to 2 in. long and long-stalked.

Family CXXIII. PIPERACEAE.

Herbs or shrubs, usually aromatic, the branches often swollen at the nodes. *Leaves* alternate opposite or whorled, often gland-dotted; stipules none or 2 connate or adnate to the petiole. *Flowers* minute, hermaphrodite or unisexual, bracteate, in axillary or terminal catkin-like spikes. *Perianth* 0. *Stamens* 1—10, hypogynous or connate with the ovary at its base; anthers often jointed on the filaments, the cells dehiscing longitudinally. *Ovary* usually 1-celled with a single terminal orthotropous ovule, sometimes of 3—4 carpels; stigmas sessile, simple or pericillate. *Fruit* an indehiscent berry in species with 1 cell, otherwise of separate cocci or follicles. *Seed* adherent to the endocarp, globose ovoid or oblong; testa thin; albumen floury; embryo in a cavity remote from the hilum; cotyledons minute or obsolete; radicle superior.

Flowers dioecious; spikes solitary; fruit an ovoid or globose fairly large berry; leaves usually with prominent ribs.....1. **Piper.**

Flowers hermaphrodite, very small:—

Spikes soft and thick, 3—7 together in umbels; berry trigonous, cuneiform; leaves often very large, orbicular-cordate.....2. **Heckeria.**

Spikes slender, solitary fascicled or paniced; berry very minute, dry, globose or ovoid; leaves usually small and succulent.....3. **Peperomia.**

1. **Piper**, Linn. (in part).

Shrubs, rarely herbs, erect or scandent, often glandular and aromatic, the branches with swollen nodes. *Leaves* entire, often unequal-sided; stipules various. *Flowers* minute, dioecious, rarely hermaphrodite, each in the axil of a bract with or without lateral bracteoles, arranged in spikes often very closely congested and usually opposite the leaves. *Perianth* 0. *Stamens* 2—4, rarely more; filaments short; anthers 2-celled, the cells distinct. *Ovary* 1-celled; ovule solitary; style short or 0; stigmas 2—5. *Fruit* a small ovoid or globose 1-seeded berry. *Seeds* usually globose; testa thin; albumen floury; radicle superior.

Flowers in cups probably formed of connate bracts making receptacles alternate on rather fleshy spikes; leaves elliptic-ovate or lanceolate, 3-ribbed at base with another pair a little higher up, the nervules reticulate:—

Receptacles distant, stalked, recurved, the spikes glabrous, ♂ very long

1. *galcatum*. ✓

Receptacles close, sessile, globose, the spikes minutely pubescent or downy

2. *trichostachyon*. ✓

Flowers subtended by peltate orbicular bracts, ♂ with 2 stamens, ♀ with sessile stigmas, usually 3—5-lobed; berries partly sunk in the rhachis:—

Leaves with prominent ribs from the base or near it:—

Fruiting spikes cylindric, thick; ♂ spikes narrow:—

Leaves glabrous:—

Fruiting spikes about .75 in. long, .25 in. thick; ♂ spikes 1—3 in. long; upper leaves ovate or ovate-oblong, acute, often unequally cordate at base, sessile and amplexicaul, lower leaves ovate, deeply and widely equally cordate, petioled, all 7-ribbed, glabrous.....3. *longum*. ✓

Fruiting spikes up to 5 in. long, .5 in. thick, ♂ spikes 3—6 in. long, very narrow; leaves ovate-oblong or ovate-cordate, petioled, 5—7-ribbed, glabrous

Bette. ✓

Leaves pubescent, especially on the nerves beneath and the lower surface when young, later nearly or quite glabrous, lanceolate, acuminate, very

unequally cordate with incurved auricles at base, 7-nerved, rugose or bullate, up to 4 in. long, 2 in. broad, fruiting spikes 75 in. long, ♂ spikes slender, 1-1.5 in. long.....4. *Hapnium*.

Fruiting spikes globose, 3-5 in. in diam., ♂ spikes very slender, 2-3 in. long; leaves elliptic-ovate or lanceolate, obtusely caudate-acuminate, acute at base, 3-5-ribbed with another pair a little higher up, shortly petioled

5. *brachystachyum*.

Fruiting spikes loose and often interrupted, ♂ spikes narrow, elongate:—
Leaves somewhat coriaceous, ovate, acute or obtusely acuminate, obtuse or subcordate at base, sparsely hirsute, 5-7-ribbed from the base or close to it, up to 4 in. long, 2 in. broad; ♀ spikes very slender when young, 2 in. long.....6. *Hookeri*.

Leaves very coriaceous, elliptic-ovate or ovate-oblong, obtusely acute or rarely acuminate, obtuse or shortly cordate at base, 3-5-ribbed from the base with another pair about .25 in. above it and usually alternate; all ribs as well as transverse nerves and reticulation very prominent, margin often recurved, up to 4.5 in. long, 2.5 in. broad; ♂ spikes usually about 4 in. long, ♀ spikes stout, the fruit fleshy.....7. *Schmidtii*.

Leaves pinnately nerved, not ribbed, the nerves 5-6 pairs, lanceolate, long acuminate, unequally acute at base, glabrous, up to 6 in. long, 2 in. broad; stipules lanceolate, .5-75 in. long; ♂ spikes 3-4 in. long, narrow, on slender peduncles up to 3 in. long, ♀ not known.....8. *Barberi*.

Flowers subtended by bracts adnate to the rachis:—

Bracts forming a short cup under the flowers (♂, ♀ or ♂) the bracteoles in ♀ in a hood-like ridge above; leaves coriaceous, broadly ovate (in ♂ often elliptic and narrow), acuminate, glabrous, 5-9-ribbed, 2-3 pairs of ribs basal, the others higher up, often impressed above, up to 9 in. long, 4.5 in. broad; ♂ spikes slender, usually 4-5 in. long, ♀ slender, up to 6 in. long, the berries large, .25 in. in diam. or more.....9. *nigrum*.

Bracts adnate to the rachis with decurrent free membranous margins, confluent in the ♀ with the bracteoles above the ovary, under-surface crispate-hairy:—

Leaves membranous:—

Leaves beneath, also branchlets and petioles, pubescent with crisped hairs; leaves variable in shape, usually ovate or elliptic-ovate, abruptly acuminate, rounded or cordate, often unequally, at base, 5-7-ribbed from the base, two upper pairs a little higher and extending to the tip, up to 5 in. long, 3.5 in. broad; ♂ spikes slender, 3 in., ♀ to 6 in. or more

10. *hymenophyllum*.

Leaves beneath covered with round silvery scales, above often bullate; leaves variable in size, elliptic or lanceolate, acuminate, acute and often oblique at base, 5-7-ribbed, the upper pair rather higher up and reaching the tip, up to 6 in. long, 2.5 in. broad; ♂ spikes very slender, 4-6 in., ♀ to 6 in.

11. *argyrophyllum*.

Leaves and branchlets quite glabrous, ovate or suborbicular, abruptly acuminate, rounded or cordate, sometimes obliquely, at base, 7-ribbed from the base, up to 4 in. long, 3.5 in. broad; the ♂ spikes extremely slender, elongate, up to 10 in. long.....12. *attenuatum*.

Leaves broadly ovate or orbicular, rarely elliptic, abruptly acuminate at base, 5-8-ribbed quite from the base or the leaves transverse and reticulate, joining the ribs, and ♀ spikes rather thick, 3-4 in. long, berries rather close.....13. *Wightii*.

E. J. N. 80, Muldera Wightii

Hills (P

dense

9. *PIPER NIGRUM*, Linn.; F. B. I. v. 90.
W. Ghâts, in all Districts, at 1,500—5,000 ft., in evergreen forest; largely cultivated. Black or White pepper.
A stout glabrous climbing shrub, at first rooting at the nodes like ivy, the leaves small and cordate, gradually getting larger, later sending out strong flowering branches with large leaves and berries up to .25 in. diam. Dr. Barber would apparently separate a form with big berries but it hardly seems even of varietal rank. It probably arose from chance cultivated seeds.
10. *PIPER HYMENOPHYLLUM*, Miq.; F. B. I. v. 93; Wt. Ic. t. 1942.
W. Ghâts, from Mysore and the Nilgiris southwards, in evergreen forests, at 1,500—5,000 ft.
A slender climber at first rooting at the nodes and having broad cordate leaves, afterwards spreading and branching, with narrower and often elliptic variable leaves, the berry small. Berries small, globose, or slightly oblong, .1—2 in. in diam.
11. *PIPER ARGYROPHYLLUM*, Miq.; F. B. I. v. 93; Wt. Ic. t. 1941.
W. Ghâts, Coorg and Nilgiris southwards, in evergreen forest and Shola, 1,500—7,000 ft.
A slender climber similar to the last (in some cases more slender) and difficult sometimes to separate from it, for crisped hairs occur to some extent in this and white scales may sometimes be found in that as also in *P. Wightii*. Berries globose, .2—3 in. in diam. A small-leaved form (var. 2 or var. 5 of the F. B. I.) may perhaps have to be separated when better known.
12. *PIPER ATTENUATUM*, Buch.-Ham.; F. B. I. v. 92; Wt. Ic. t. 1933.
P. sylvestre, Wt. Ic. t. 1937; F. B. I. v. 93. *P. trioicum*, Roxb.; Wt. Ic. tt. 1935, 1936.
N. Circars, forests of the hills of Vizagapatam and Godavari at 2,000—3,000 ft.; W. Ghâts, Malabar and Nilgiris to Travancore and Tinnevely, in evergreen forests at low levels.
A slender climber with often somewhat zigzag branchlets and ovate-cordate leaves, the berries globose, very small. This seems to be the Circar species which Roxburgh cultivated at Samulcotta as true pepper.
13. *PIPER WIGHTII*, Miq.; F. B. I. v. 94; Wt. Ic. t. 1939.
W. Ghâts, Nilgiris and Pulneys, above 6,000 ft. in Shola forests.
A stout climber with smooth stems, at first rooting ivy-like on trees and with small cordate leaves, later branching out and spreading, the leaves rather variable but always prominently reticulate, the berries small with prominent stigmas. White scales, as in *P. argyrophyllum*, are often found on the under-surface of the leaves, but this is a much stouter plant.
P. Betle, Linn., is the Betel pepper, a perennial Malay creeper extensively cultivated in hot damp localities for its leaves (Pán) which are rolled up with portions of areca nut, lime, catechu, cardamoms and other ingredients, sold in shops and universally chewed. The plants are cultivated in special trellised gardens.

2. *Heckeria*, Kunth.

Shrubs, usually with succulent branches. *Leaves* large, long-petioled, orbicular or peltate, cordate at base, the petiole sheathing. *Flowers* very minute, hermaphrodite, in very close slender cylindrical spikes in pedunculate umbels in the axils of the leaves; bracts pedicelled, peltate. *Perianth* 0. *Stamens* 2—3, at the base of the ovary; anthers very small, 4-valvate. *Ovary* free; stigmas 3. *Fruit* a very small indehiscent, usually trigonous berry. *Seeds* adherent to the pericarp; albumen floury.

HECKERIA SUBPELTATA, Kunth. *Piper subpeltatum*, Willd.; F. B. I. v. 95. *Pothomorphe subpeltata*, Miq.; Wt. Ic. t. 1925.

W. Ghâts, in all Districts, in evergreen forests, up to 3,000 ft. A large herbaceous shrub, often 3—5 ft. high with orbicular acute, deeply cordate leaves palmately nerved and reticulate, up to 12 in. in diam., the spikes often 5—6 in. long, 3—7 together in the umbel, the fruits trigonous.

3. *Peperomia*, Ruiz & Pav.

Annual or perennial usually succulent herbs. *Leaves* alternate, opposite or whorled, entire, pellucid-punctate; stipules 0. *Flowers* minute, hermaphrodite, sessile or sunk in the rhachis, erect, in terminal or leaf-opposed, solitary or paniced, rarely axillary spikes; bracts sessile, often peltately attached. *Perianth* 0. *Stamens* 2; filaments very short; anther-cells confluent. *Ovary* 1-celled, obtuse acute or beaked; ovule solitary, erect; stigma lateral or terminal, usually penicillate. *Fruit* a minute, indehiscent, almost dry nutlet, the pericarp very thin. *Seed* minute, testa membranous; albumen floury.

Leaves coriaceous, small, .2—3 in. in diam., rarely more, pale when dry, the ribs and nerves invisible:—

Leaves in whorls of 4, orbicular, nearly sessile, glabrous; spikes stout, .75—1.5 in. long, with pubescent rhachis, the peduncles about .5—.75 in. long, the nutlets ovoid, acute.....1. *reflexa*.

Leaves opposite or alternate, obtuse or emarginate, with slender petiole .2 in. long, minutely puberulous; spikes slender, .75 in. long, with glabrous rhachis, the peduncles scarcely .25 in. long, the nutlets ellipsoid.....2. *Heyneana*.

Leaves fleshy, opposite or alternate or both, the ribs and sometimes nerves visible:—

Leaves and stems glabrous or very nearly so:—

Leaves mostly alternate, prominently 5-ribbed from the base, elliptic-ovate, acute, cuneate at base, up to 3.5 in. long, 2 in. broad, the petiole to .75 in.; spikes very slender, up to 4 in. long, the peduncle to 1 in., the nutlets globose, scurfy and black-punctate.....3. *Thomsoni*.

Leaves mostly opposite or the upper whorled, lower ones often alternate, 3-ribbed:—

Leaves obovate, obtuse or emarginate, cuneate at base, up to 1.5 in. long, 1 in. broad, the petiole .2—.5 in.; spikes rather stout, up to 2 in. long, the peduncle to 1 in., the nutlets ovoid, minutely scaly.....4. *portulacoides*.

Leaves elliptic orbicular or obovate, obtuse, rounded at base, up to .75 in. in diam., the petiole to .25 in., the side ribs very obscure; spikes slender, up to 2 in. long, the peduncle short, the nutlets ovoid, minutely rugose and scurfy.....5. *Wightiana*.

Leaves and stems pubescent with crisped hairs, leaves usually opposite, 3—5-ribbed from the base, but rather obscurely, elliptic-ovate or obovate, rounded or slightly acute, up to 1.5 in. long, 1 in. broad, petiole to .5 in.; spikes slender, often in terminal panicles, up to 4 in. long, the peduncle .75 in., the nutlets globose, punctate.....6. *dindigulensis*.

Leaves very thin, membranous when dry, broadly ovate-deltoid, acute, 5—7-ribbed, opposite and alternate, about 1 in. in diam.; spikes very slender, opposite the leaves, the nutlets ribbed and reticulate.....*pellucida*.

1. *PEPEROMIA REFLEXA*, A. Dietr.; F. B. I. v. 99; Wt. Ic. t. 1923, 1.
N. Circars, in Ganjam and up to 4,000 ft. on Mahendragiri;
W. Ghâts in all Districts from the Coimbatore Hills and Nilgiris
southwards, usually above 4,000 ft.
A succulent tufted herb growing epiphytically on tree-trunks.
2. *PEPEROMIA HEYNEANA*, Miq.; F. B. I. v. 99.
Bababudan Hills of Mysore, at 6,000 ft. (Meebold), Ootacamund
in Nilgiris (G. King).
A small epiphytic herb with emarginate leaves, sometimes up
to 1 in. long, but usually much smaller.
3. *PEPEROMIA THOMSONI*, Hook. f.; F. B. I. v. 97. *P. dindigulensis*,
Wt. Ic. t. 1921, *not* of Miq. (not good).
W. Ghâts, Anamalai and Pulney Hills, at rather low levels.
A large-leaved (comparatively) succulent epiphyte rooting in
moss on the branches of trees.
4. *PEPEROMIA PORTULACOIDES*, A. Dietr.; F. B. I. v. 98; Wt. Ic. t.
1922, 2. *P. courtallensis*, Miq.; Wt. Ic. t. 1923, 2.
W. Ghâts, hills of Tinnevely and Travancore, Avalanché in
Nilgiris, probably over 5,000 ft.
An erect glabrous succulent herb, growing on rocks and tree-
trunks.
5. *PEPEROMIA WIGHTIANA*, Miq.; F. B. I. v. 98; Wt. Ic. t. 1924 (except
pubescence).
W. Ghâts, Nilgiris and Pulneys above 4,000 ft.
A small slender succulent herb, growing on moist rocks and
on the branches of trees. The tips of the leaves are sometimes
ciliate.
6. *PEPEROMIA DINDIGULENSIS*, Miq.; F. B. I. v. 98. *P. Heyneana*, Wt.
Ic. t. 1922, 1, *not* of Miq.
N. Circars, Bison Hill, Godavari (Barber); Carnatic, Shevaroy
Hills of Salem, Kollimalai Hills of Trichinopoly; W. Ghâts,
from Malabar southwards at about 2,000—4,000 ft.
An erect, rather large, succulent herb, growing on wet rocks
or on tree branches, conspicuous by its pubescence.
7. *PEPEROMIA PELLUCIDA*, H. B. & K.
Madras, a weed in gardens; W. Coast, at Trevandrum, intro-
duced and clearly run wild, a native of S. America.
A slender succulent herb with weak procumbent stems.

Family CXXIV. CHLORANTHACEAE.

Herbs, shrubs or trees, usually aromatic. *Leaves* opposite, usually toothed, the petioles often connate in a sheath; stipules small, subulate, usually on the margin of the sheath. *Flowers* in terminal or pseudo-axillary spikes heads or panicles, unisexual or hermaphrodite from the ♂ and ♀ cohering supported by a bract: ♂ flowers without perianth, ♀ also or with a 3-toothed limb adnate to the ovary.

Stamens 1 or 3, connate; filaments very short and thick; anthers 2-celled, or if 3, side ones 1-celled. *Ovary* 1-celled; ovule 1, orthotropous, pendulous; style very short. *Fruit* a small, ovoid or globose, drupe, exocarp fleshy, endocarp crustaceous. *Seed* pendulous; testa membranous; albumen copious, fleshy; embryo minute; cotyledons divaricate or scarcely distinct; radicle inferior.

1. *Chloranthus*, Swartz.

Perennial herbs or shrubs, the stems articulate at the nodes. *Flowers* in terminal simple or paniced spikes, hermaphrodite; the ♂ and ♀ connate on a bract; perianth 0. *Stamens* 1 or 3 confluent; if 3 the central anther 2-celled, the side ones 1-celled. *Ovary* with subsessile truncate stigma.

CHLORANTHUS BRACHYSTACHYS, Blume; F. B. I. v. 100. *Sarcandra chloranthoides*, Gardn.; Wt. Ic. t. 1946.

W. Ghâts, hills of Malabar, Bolumpatti Valley, Anamalais, Pulneys and Tinnevely at 2,000—5,000 ft., in moist forests.

A small bush reaching 4 ft. in height, the lanceolate leaves coarsely spinous-serrate, reaching 7 in. long, the single stamen with large thickened connective and filament, the berries globose, purplish-black.

Family CXXV. MYRISTICACEAE.

Evergreen tree, often stellately tomentose. *Leaves* alternate, entire, often pellucid-punctate; stipules 0. *Flowers* small, dioecious, regular, in axillary or lateral panicles cymes umbels or fascicles, rarely in racemes; bracteoles persistent or caducous. *Perianth* gamophyllous, inferior, with 3, sometimes 2 or 4, lobes valvate in bud. *Androecium* in ♂ flowers of 3 or more extrorse anthers connate in a sessile or stipitate column, ring or disk; anthers 2-celled, linear or ovate. *Ovary* in ♀ flowers superior, free, 1-celled; ovule 1 basal, erect, anatropous; stigma capitate discoid or lobed. *Fruit* more or less fleshy, splitting usually into 2, rarely 4, valves. *Seeds* erect, enclosed in a thin or fleshy, entire or lacerate, coloured, often aromatic arillus; testa usually thick, albumen copious, hard, ruminant; embryo very small, basal; cotyledons divaricate, flat or crumpled; radicle short, inferior.

Anthers attached by their backs to a column formed of the connate filaments:—

- | | |
|---|----------------------------|
| Anther-column sessile, the apices of the anthers free..... | 1. <i>Gymnacranthera</i> . |
| Anther-column stipitate and usually produced beyond the anthers which are completely attached to it..... | 2. <i>Myristica</i> . |
| Anthers attached by their bases stellately to a peltate usually stipitate column formed of the connate filaments..... | 3. <i>Knema</i> . |

1. *Gymnacranthera*, Warb.

Trees. *Leaves* alternate, entire, evergreen, pergamaccous. *Flowers* small, dioecious, ♂ in fascicles in axillary panicles, ♀ in short axillary racemes, bracts deciduous. *Perianth* 3—4-lobed. *Androecium* sessile, the connectives combined in an oblong thick column; anthers 6—12, elongate, the lower parts adnate to the column by their backs,

the apices free, often inflexed over the column. *Ovary* ovoid; stigmas sessile, connate, scarcely bilobed. *Fruit* globose or ovoid; pericarp thick, fleshy; arillus laciniate almost to the base. *Seed* conforms to the fruit; testa woody; albumen ruminant; cotyledons divaricate, connate at base.

GYMNACRANTHERA CANARICA, Warb. Monog. Myrist. 368. *Myristica canarica*, King, Ann. Calc. iii. 307, t. 138. *M. Farquhariana*, Wall.; F. B. I. v. 108 in part; Bedd. Fl. t. 270.

W. Ghâts, from S. Canara southwards to Travancore, in evergreen forests at low levels about 1,000 ft. alt.

A very large evergreen tree with oblong leaves up to 10 in. long, 4 in. broad, glaucous beneath. The fruit is globose about 1 in. in diam. Bark smooth, brown; wood yellowish-grey, coarse, moderately hard, of little value. The seeds can be used in the making of candles, as they contain much fat. Vern. Kan. Pindî; Mal. Undai pānu.

2. Myristica, Linn.

Trees. *Leaves* alternate, entire, evergreen, pergamaceous or chartaceous. *Flowers* small, dioecious, in cymes umbels or fascicles, from the axils of the leaves or of the scars of fallen leaves, the peduncles usually thick; bracts deciduous; bracteoles persistent, usually oblique, at the base of the perianth. *Perianth* 3-lobed. *Androeceum* stalked, the filaments and connectives connate in a column usually produced beyond the anthers; anthers 12—30 elongate. *Ovary* ovoid; stigmas connate, 2-lobed. *Fruit* large, ovoid or oblong; pericarp thick, succulent, rarely leathery; arillus laciniate. *Seed* conform to the fruit; testa hard; albumen ruminant; cotyledons connate.

Flowers urceolate in paniced cymes, the peduncles slender; ♀ larger than ♂; leaves rather thin:—

Cymes few-flowered, at most 3—5 in ♂, fewer in ♀; perianth 2—3 in. long, tawny-villous, the pedicels drooping, about .5 in. long; leaves elliptic-lanceolate, acuminate, 3—5 in. long, 1.5—2 in. broad, subglaucous beneath, nerves about 8 pairs; fruit broadly pyriform, up to 2 in. long, the pericarp yellow, the arillus red and much lacinate *fragrans*.
 Cymes dichasioid, up to 20 in ♂ flowers, only 3 or 4 in ♀; perianth 2—2.5 in. long, subglabrous, the pedicels about .25 in. long; leaves elliptic-oblong, sub-obtuse, 3—7 in. long, 1—3 in. broad, brown beneath, nerves about 10 pairs; fruit cylindrical, 2—3 in. long, .75 in. broad, villous, the arillus yellow 1. *malabarica*.

(Flowers ovoid, in short cymes or fascicles on thick woody peduncles; leaves thick and large with prominent nerves:—)

Leaves beneath densely reddish tomentose, smooth and glabrous above, oblong or elliptic-oblong, acute at apex, rounded at base, 12—24 in. long, 4—6 in. broad, main nerves 20—26 pairs, impressed above, petiole stout, .5—1 in. long, channelled; flowers rather small, densely rusty tomentose, ♀ slightly larger but less numerous than ♂; fruit oblong up to 4 in. long, densely tomentose, the arillus orange-red and deeply much lacinate 2. *magnifica*.

(Leaves beneath glabrous and usually glaucous, smooth above:—)

Leaf nerves and transverse nervules conspicuous, leaves 5—10 in. long, 2.5—4 in. broad; fruit globose, 2—2.5 in. in diam., the pericarp fleshy, the lacinae of the orange-red arillus with their ends separate 3. *Beddomei*.
 Leaf nerves only conspicuous, the rest faint, leaves oblong lanceolate up to 10 in. long, 4 in. broad; fruit lanceolate, 1.5—2.5 in. long, the pericarp fleshy, the lacinae of the arillus drawn together at their tips 4. *contorta*.

1. MYRISTICA MALABARICA, Lamk.; F. B. I. v. 103; Bedd. Fl. t. 269; King Ann. Calc. t. 109; Warb. Monog. Myrist. t. xii. 1.
W. Gháts, in evergreen forests from S. Canara southwards, at low levels up to 1,000 ft.
A tree reaching 50 ft. in height and a diam. of 1·5 ft. Bark greenish-black, smooth; wood yellowish-brown tinged with grey, moderately hard, not durable and of little use. Vern. *Kan.* Kanagi; *Tam.* Patthiri; *Mal.* Ponnám pánu.
2. MYRISTICA MAGNIFICA, Bedd. Fl. t. 268; F. B. I. v. 104; King Ann. Calc. t. 119.
W. Gháts, Travancore and parts of Tinnevely and Canara (Bourdillon), especially common about Kolaturpoli, in swampy ground in evergreen forests.
A lofty tree reaching 90—100 ft. in height (Cooke), 120 ft. (Bourdillon), often buttressed and furnished with numerous aerial roots, which start from the trunk at 10—20 ft. above ground and spread along the ground, rising in loops above it. Bark purplish-black, smooth; wood yellowish-white, soft and perishable. Vern. *Mal.* Kotha pánu.
3. MYRISTICA BEDDOMEI, King Ann. Calc. 291, t. 118. *M. laurifolia*, Hook. f. & Th., var. *lanceolata*, Hook. f.; F. B. I. v. 103. *M. laurifolia*, Bedd. Ic. t. 267 fruit only (flowering branch is probably *M. malabarica*).
W. Gháts, in all Districts, in evergreen forests, up to 5,000 ft. Wild Nutmeg.
A large tree reaching 90 ft. in height, with a diameter of about 2·5 ft. Bark blackish-green, rather smooth; wood yellowish brown, moderately hard, perishable and of no great value. Vern. *Kan.* Jajikai; *Mar.* Jayaphal; *Tam.* Kathu jathikai; *Mal.* Pattha pánu.
4. MYRISTICA CONTORTA, Warb. Monog. Myrist. 507, t. 16 part.
W. Gháts in S. Canara and Malabar up to 3,000 ft., in evergreen forest; Lower Pulneys (Bourne).
A large tree, apparently only really separable from *M. Beddomei* by the fruit, and quite doubtfully distinct from it.
M. fragrans, Houtt., is the Nutmeg tree, native of the E. Moluccas and cultivated more or less throughout Malaya. In India it is only found as a specimen tree in a few localities, chiefly Botanic Gardens like Barliyar, where the climate is sufficiently hot and moist. The "nutmeg" is given by the large seed, and the arillus outside it gives the spice known as "mace."

3. Knema, Lour.

Trees. *Leaves* alternate, evergreen, coriaceous or chartaceous. *Flowers* small, dioecious, ♂ in fascicles on thick peduncles from the axils of leaves or of the scars of fallen leaves, ♀ similar but fewer and rather longer; bracts deciduous; pedicles bracteolate. *Perianth* 3-lobed. *Androecium* usually stalked; filaments and connectives connate in a peltate disk; anthers 8—20, free, attached stellately to the margin of the disk, dehiscing downwards. *Ovary* ovoid; style short, thick;

stigmas 2, lacinate on the margins. *Fruit* ovoid or oblong; pericarp thick, fleshy, tomentose; arillus lacinate at the apex only. *Seed* conform to the fruit; albumen ruminant; cotyledons divaricate or sub-erect.

KNEMA ATTENUATA, Warb. *Myristica attenuata*, Wall.; F. B. I. v. 110; King Ann. Calc. t. 152. *M. corticosa*, Bedd. Fl. t. 271, not of Lour.

W. Ghâts, from S. Canara southwards, in evergreen forests up to 2,000 ft.

A moderate-sized tree with oblong-lanceolate acuminate leaves up to 8 in. long, 2–3 in. broad, prominently and regularly nerved, glaucous and rusty pubescent beneath, the flowers stellately pubescent, the fruit ovoid, 1.5 in. long, the aril of a brilliant crimson. Bark greenish-black, smooth; wood pale brown, moderately hard, of little value. Vern. *Kan.* Rukt maru; *Tam.* Chora pathiri; *Mal.* Chora panu.

Family CXXVI. LAURACEAE.

Erect aromatic trees or shrubs, or (*Cassytha*) leafless twining parasites, usually evergreen. *Leaves* alternate, rarely opposite or subopposite, entire, stipules 0. *Flowers* regular, small hermaphrodite or dioecious, in axillary or lateral cymes clusters racemes or panicles, sometimes in umbellules; bracts deciduous, often involucrate, sometimes 0. *Perianth* usually inferior; tube short, often enlarging in fruit; lobes usually 6, sometimes more, sometimes only 4, in 2 series, equal or unequal, deciduous or persistent in fruit, sometimes enlarged as are the pedicels. *Stamens* usually a multiple of the perianth-lobes, in 2–4 series on the tube; filaments of the inner rows usually, of the outer sometimes with a pair of glands attached or alongside; anthers erect, 2–4-celled, the cells dehiscing by upcurved, at length deciduous, valvular lids, the 4th row of stamens often reduced to glands; in ♀ flowers the stamens replaced by staminodes, usually linear or clavate, the inner biglandular as in ♂. *Ovary* sessile at the base of the perianth-tube, 1-celled; ovule solitary, anatropous, pendulous from the top of the cell. *Fruit* a dry or fleshy berry or drupe, naked or enclosed in the perianth-tube or supported by the more or less enlarged perianth-tube and lobes, the pedicel frequently thickened. *Seed* pendulous; testa membranous; albumen 0; cotyledons plano-convex, fleshy; radicle minute, superior.

Trees or shrubs:—

Stamens of 3rd row, when present, with extrorse anthers:—

Anthers 2-celled:—

Fruit surrounded by the enlarged perianth-tube.....1. *Cryptocarya*.

Fruit not surrounded by the enlarged perianth-tube:—

Fruiting perianth persistent.....2. *Apollonia*.

Fruiting perianth deciduous.....3. *Beilschmiedia*.

Anthers 4-celled:—

Leaves opposite or subopposite rarely alternate, usually 3- or more-ribbed; fruiting perianth enlarged into a cupule embracing the fruit

4. *Cinnamomum*.

- Leaves alternate:—
 Fruiting perianth-tube enlarged, fruiting pedicels enlarged, thick and usually warted.....5. *Alseodaphne*.
 Fruiting perianth-tube and pedicels hardly enlarged:—
 Fruiting perianth-lobes reflexed.....6. *Machilus*.
 Fruiting perianth-lobes erect, cup-like.....7. *Phoebe*.
 Stamens of all rows with introrse anthers, the lower cells sometimes lateral:—
 Fertile stamens 9; involucre bracts deciduous in flower; leaves usually subverticillate, 3-ribbed or 1-ribbed, penninerved.....8. *Actinodaphne*.
 Fertile stamens normally 9 or 12, frequently more, rarely less; involucre bracts persistent in flower; leaves alternate or subopposite, penninerved.....9. *Litsea*.
 Fertile stamens 6; involucre bracts early deciduous; leaves alternate or subverticillate, 3-ribbed.....10. *Neolitsea*.
 Leafless filiform twining parasites with suckers; stamens with 4-celled anthers, outer two rows introrse, inner row extrorse.....11. *Cassytha*.

1. *Cryptocarya*, R. Br.

Evergreen trees or shrubs. *Leaves* usually alternate, penninerved or 3-ribbed, more or less coriaceous. *Flowers* small, hermaphrodite, in axillary or subterminal pedunculate panicles; bracts and bracteoles present but often early caducous. *Perianth-tube* turbinate or ovoid, ultimately narrowed at the top; lobes 6, in two rows, subequal. *Stamens* 9 perfect, those of the 1st row introrse opposite the 3 outer perianth lobes, those of the 2nd row introrse opposite the 3 inner lobes, within and alternate with the stamens, 6 stipitate glands, then those of the 3rd row extrorse opposite the stamens of the 1st row, then, slightly within these, 3 stipitate cordate staminodes opposite the stamens of the 2nd row; all stamens 2-celled, the connective often produced. *Ovary* sessile at the bottom of the perianth-tube and enclosed in it; style shortly exserted; stigma obtuse or capitate. *Fruit* drupaceous, hardened or fleshy, smooth or ribbed, enclosed in the accrescent perianth-tube; pericarp membranous or thinly crustaceous, more or less free from the perianth-tube. *Seed* with a membranous testa, often not separable from the pericarp; cotyledons thick, fleshy; radicle minute.

Leaves beneath with prominent nerves and transverse nervules, all fulvous-tomentose, the reticulation also villous, elliptic-obovate, abruptly sharp-acuminate, up to 8 in. long, 4 in. broad; flowers in short axillary fulvous panicles of cymes with prominent bracts and bracteoles, apparently persistent.....1. *anomalayana*.

Leaves beneath glabrous except sometimes the midrib and nerves; bracts and bracteoles deciduous:—

Flowers in spreading terminal or axillary panicles:—

Leaves ovate or elliptic, obtuse or suddenly shortly acute at apex, rounded or even truncate at base, shining above, reddish-glaucous beneath, the nerves distant, impressed above, the transverse nervules also distant but distinct, reticulation not dotted-areolate, up to 5 in. long, 2.5 in. broad; panicles usually axillary, fulvous-pubescent, up to 5 in. long.....2. *Beddomei*.

Leaves elliptic or elliptic-oblong, glaucous beneath, the nerves prominent beneath, the transverse nervules indistinct, the reticulation dotted-areolate:—

Main nerves 9—12 pairs, leaf-apex abruptly and obtusely acuminate, base rounded, up to 9 in. long, 4 in. broad; berry globose, .5 in. in diam., dull and smooth.....3. *Bourdillonii*.

Main nerves 6—8 pairs, leaf-apex obtuse or emarginate, sometimes slightly acute, base acute, 3—5 in. long, 1—2 in. broad; berry ovoid, 1.5 in. long, .75 in. broad, furrowed and often lenticellate.....4. *Lawsonii*.

Flowers in short congested axillary or terminal tawny-tomentose panicles:—

Leaves elliptic- or ovate-oblong, obtuse or slightly acute at apex, rounded at base, smooth and dull above, glaucous beneath and reticulate, the nerves 5—7 pairs often pubescent; up to 4 in. long, 2·25 in. broad; berry ovoid, black, 5 in. long.....*S. neilgherrensis*.

Leaves ovate-obovate or oblong, sometimes almost orbicular, obtuse or emarginate at apex, obtuse at base, shining above, subglaucous beneath, the transverse nervules prominent, the nerves 5—8 pairs; sometimes tornenrose, up to 4 in. long, 2·5 in. broad; berry oblong, 1 in. long, 3—4 in. broad, smooth

6. *Stocksii*.

1. *CRYPTOCARYA ANAMALAYANA*, Gamble in Kew Bull. 1925, 126. *C. sp.*; F. B. I. v. 121.
W. Ghâts, Anamalai Hills, at 3,000 ft. (Bedd., Barber).
A tree with rather thin leaves with prominent transverse nervules and fulvous tomentose branchlets and inflorescence.
2. *CRYPTOCARYA BEDDOMEI*, Gamble in Kew Bull. 1925, 127.
W. Ghâts, S. Canara plains (Beddome); Udumanparai in Anamalais (Barber).
A tree with coriaceous leaves.
3. *CRYPTOCARYA BOURDILLONII*, Gamble in Kew Bull. 1925, 127. *C. Wightiana*, Hook. f.; F. B. I. iv. 120 in part, not of Thw.
W. Ghâts, Kolaturpoli, Travancore, up to 500 ft. in evergreen wet forest (Bourdillon), S. Tinnevely (Beddome).
A tall tree, probably in part *C. Wightiana*, Bourd. Trav. Trees 296. The main nerves are smooth or slightly raised above, the midrib impressed, the transverse nervules subparallel. In young shoots the leaves may reach a large size, more than 12 in. long and 6 in. broad, with a thick petiole of 2 in.
4. *CRYPTOCARYA LAWSONI*, Gamble in Kew Bull. 1925, 127.
W. Ghâts, Kundahs Sholas in Nilgiris above 5,000 ft. (Lawson, Gamble); hills of Tinnevely (Beddome, Tadulingam).
A lofty tree in Tinnevely (Beddome); in Nilgiris a stout not very tall one. The main nerves are short and curved, smooth above, the midrib impressed, the transverse nervules merged in the reticulation.
5. *CRYPTOCARYA NEILGHERRENSIS*, Meissn. *C. Stocksii*, Hook. f.; F. B. I. v. 120 in part, not of Meissn.
W. Ghâts, Nilgiris at about 6,000 ft. (Wight, Gamble), Anamalais at 2,500 ft. (Beddome), in Shola forest.
A large tree (Beddome). The midrib and main nerves of the leaves are impressed above, the branchlets tawny-pubescent and lenticellate.
6. *CRYPTOCARYA STOCKSII*, Meissn.; F. B. I. v. 120 in part.
W. Ghâts, Canara to the Pulneys, Anamalais and hills of Travancore at about 4,000—5,000 ft.; Bababudan Hills of Mysore (Talbot).
A large or medium-sized tree with very coriaceous leaves and prominently lenticellate branches. The midrib and main nerves are much impressed above, and the margins often reflexed, the branchlets prominently lenticellate.

2. *Apollonias*, Nees.

Evergreen trees. *Leaves* scattered, chiefly near the ends of the branchlets, penninerved. *Flowers* very small, hermaphrodite, in axillary or subterminal racemes, the peduncles and pedicels slender. *Perianth*-tube short; lobes 6, in two rows, subequal. *Stamens* 9 perfect, those of the 1st and 2nd rows introrse, opposite the perianth-lobes, those of the 3rd row opposite the first and extrorse, with a pair of stalked glands at their bases, those of the 4th row reduced to ovate or cordate staminodes, all stamens 2-celled only. *Ovary* sessile, stigma depressed-capitate. *Fruit* drupaceous, globose or ovoid, seated on the slightly enlarged perianth lobes.

APOLLONIAS ARNOTII, Nees; F. B. I. v. 121; Wt. Ic. t. 1819; Bedd. Fl. t. 291.

W. Ghâts, forests of Tinnevely and Travancore (Wight, Barber, Lawson); Nilgiris (Gardner), in evergreen forest, at 2,500—5,000 ft. rare.

A moderate-sized tree with narrowly lanceolate long acuminate leaves, similar to those of *Phoebe lanceolata*, which has 4-celled anthers and stouter peduncles and pedicels. Vern *Mal.* Chenthanam.

3. *Beilschmiedia*, Nees.

Evergreen trees or shrubs. *Leaves* alternate or opposite, usually coriaceous, penni-nerved, venose-reticulate. *Flowers* small, hermaphrodite, axillary lateral or subterminal, in racemes or panicles. *Perianth*-tube short; lobes 6, subequal, deciduous. *Stamens* 9 perfect, those of the 1st and 2nd rows introrse, those of the 3rd row extrorse, staminodes of the 4th row cordate or ovoid, stipitate; glands 6, stipitate, nearly as large as the staminodes, between the 2nd and 3rd row of stamens; all anthers 2-celled. *Ovary* sessile, free from the perianth, attenuate into the style; stigma obtuse. *Fruit* an oblong ovoid or globose berry, the pedicels not or only slightly thickened. *Seed* with a membranous testa; cotyledons fleshy, often with a rudimentary dissepiment, sometimes ruminant.

Leaf buds small, pubescent, without coriaceous scales:—

Ovary glabrous; leaves usually alternate, elliptic- or oblong-lanceolate, obtuse or bluntly acuminate, cuneate at base, shining above, main nerves about 8—12 pairs, joined by a prominent areolate reticulation, up to 7 in. long, 2.5 in. broad; racemes axillary or lateral, pubescent, under 1 in. long, the bracts narrow, deciduous; berry oblong-obovoid up to 1—1.5 in. long.....1. *Roxburghiana*.
Ovary villous, leaves usually opposite, ovate lanceolate, obtusely acute, attenuate at base, dull above and below, main nerves 6—10 pairs, irregular, joined by a not very prominent reticulation, up to 7 in. long, 1.5—3 in. broad; racemes axillary and terminal, fulvous-villous, about 1 in. long and with prominent concave silky deciduous bracts; berry purple, cylindric, 1—1.5 in. long, .75 in. in diam., the peduncle red.....2. *Bourdillonii*.

Leaf-buds elongate, perulate, the scales lanceolate; leaves usually opposite, elliptic-lanceolate, obtusely acute or acuminate, acute at base, shining, glabrous, main nerves 10—12, the reticulation prominent, raised and areolate, up to 6 in. long, 2.5 in. broad; panicles axillary and terminal, with slender peduncles and pedicels, not bracteate; berry ovoid, up to 1.25 in. long, in diam. .7 in. smooth, purple

3. *Wightii*.

1. BEILSCHMIEDIA ROXBURGHIANA, Nees; F. B. I. v. 121; Wt. Ic. t. 1828. N. Circars, hills of E. Gháts on Mahendragiri, the Palkondas and in Rampa, from Ganjam to the Godavari, at 1,500—4,000 ft. (Gamble).
A large or moderate-sized tree with coriaceous leaves, the nerves and reticulation all prettily raised on the upper surface. Wood white, moderately hard, even-grained. Vern. Hind. Konhaia.
2. BEILSCHMIEDIA BOURDILLONT, Brandis Ind. Trees 528. *B. fagifolia*, Bedd. Fl. t. 263, not of Nees.
W. Gháts, S. Canara to Travancore, in evergreen forests up to 1,500 ft.
A large tree, the rather soft leaves both opposite and alternate. Bark dark green; wood pale brown, hard and heavy, but not used. Vern. Mal. Mora Kutthi.
3. BEILSCHMIEDIA WIGHTII, Benth.; F. B. I. v. 124. *Haasia Wightii*, Nees; Wt. Ic. t. 1831; Bedd. Fl. t. 298.
W. Gháts, Anamalais, Pulneys and hills of Travancore, up to 4,000 ft. in evergreen forests.
A large tree with characteristic perulate buds and flowers in panicles 4 in. long, the ovary glabrous. Bark brown, rough; wood hard, greyish-white with a silvery grain.

4. Cinnamomum, Blume.

Evergreen trees or shrubs, usually with aromatic bark. *Leaves* opposite or sometimes alternate, usually ribbed from near the base. *Flowers* small, hermaphrodite, in axillary lateral or subterminal cymes or panicles, in the latter case the branches usually ending in dichasia with the middle flower largest. *Perianth*-tube short, funnel-shaped, enlarged in fruit; lobes 6, subequal, persistent or partly truncate or deciduous in fruit. *Stamens* 9 perfect, those of the 1st and 2nd rows opposite the perianth-lobes introrse and eglandular, those of the 3rd row opposite the 1st row extrorse and bearing on the filaments 2 usually stipitate glands; staminodes of the 4th row opposite the 2nd row usually cordate and stipitate; anthers 4-celled. *Ovary* sessile at the bottom of the perianth-tube, narrowed into the rather thick style; stigma discoid or obscurely 3-lobed. *Fruit* a berry seated on the usually cup-shaped enlarged perianth-tube, the lobes persistent deciduous or sometimes truncate near their middle. *Seed* conform to the fruit; testa membranous; cotyledons fleshy.

— Leaves opposite or only sometimes alternate:—

Flowers few only, axillary, peduncles and pedicels slender, usually long:—

Flowers very small, under .1 in. long, glabrous, as are the stamens and ovary, in dichasioid cymes; stamens minute, the filaments very short; leaves elliptic-ovate or lanceolate, obtusely acuminate, 3-ribbed from about .2 in. above the base, minutely reticulate with many horizontal transverse nervules, up to 5 in. long, 2 in. broad, 1. *gracile*.
Flowers small, .15 in. long, grey-pubescent, in subumbellate cymes, the filaments villous; leaves linear-lanceolate, acuminate, acute at base, 3-ribbed from the base, glabrous, up to 4 in. long, 1.25 in. broad, but usually much narrower

2. *riparium*.

Flowers .2 in. long, fulvous-tomentose, in rather short fulvous racemes, often reduced to threes, the filaments villous; leaves ovate, acute or acuminate, acute at base, 3-ribbed from about .2 in. above the base, tawny villous beneath when young, sparsely so when old, up to 3 in. long, 1.4 in. broad...3. *travancoricum*.
Flowers many, in axillary or terminal panicles:—

— Leaves glabrous:—

Panicles long, many-branched, with long peduncles and pedicels, the flower-buds globose, grey-pubescent, perianth .1—2 in. long:—

Leaves large, oblong or elliptic-oblong or oblong-lanceolate, acute or acuminate, often sphacelate, 3-ribbed from at or a little above the base, the side ribs running almost to the apex, the transverse nervules horizontal and parallel, up to 18 in. long, 4.5 in. broad.....4. *iners*.

— Leaves moderate-sized, ovate or elliptic-ovate or ovate-lanceolate, shining above:—

— Leaves 3—5-ribbed from a little above the base, the chief side ribs ending about three-fourths up, nervules irregularly reticulate, the base usually rounded, up to 6 in. long, 3 in. broad.....5. *zeylanicum*.

Leaves 3—5-ribbed from about .3 in. above the base, ovate, obtuse at apex, attenuate at base into the long petiole, the ribs faint, the side ones ending about half-way up, nervules obscure, but 2—3 pairs of faint nerves from the midrib.....6. *litseaefolium*.

Panicles short and compact, but long-peduncled, up to about 3 in. in length, fulvous tomentose, pedicels short, perianth .25 in. long; leaves broadly ovate, obtuse or acute, rounded or acute at base, often glaucous beneath, 3—5-sometimes 7-ribbed from .3 to .5 in. above the base, a few nerves both from the midrib and side ribs, reticulation areolate; up to 4 in. long, 3.5 in. broad.....7. *Wightii*.

Panicles long-peduncled, but comparatively few-flowered, up to 5 in. long in all, the flowers elongate, with the thickened perianth up to .5 in. long; leaves elliptic-ovate or oblong, obtuse, narrowed at base into the broad petiole, 3—5-ribbed, the 3 inner from nearly .5—1 in. above the base, reaching nearly to the apex, the middle two with nerves; up to nearly 9 in. long, 2.5—3.5 in. broad.....8. *macrocarpum*.

Leaves hairy, at any rate on the under surface:—

Flowers small, .2 in. long with pedicels, the buds globose, yellowish-tawny tomentose, in panicles up to 4 in. long; leaves elliptic-oblong or ovate-lanceolate, acute or acuminate, 3-nerved from at or a little above the base and the side ribs nearly to the apex, when young glaucous and yellowish-pubescent beneath, afterwards glabrous; up to 7 in. long, 2.5 in. broad, but mature leaves usually much smaller.....9. *sulphuratum*.

Flowers rather large, .3 in. long, usually in threes on the branches of densely fulvous-tomentose panicles 1—4 in. long; leaves also when young densely fulvous-tomentose on both sides, less so when old, opposite or alternate, ovate or oblong, sometimes lanceolate or even orbicular, obtuse or acute, 3—5-ribbed from near the base, the side ribs to the apex, often joined to the centre ones by nerves; up to 5 in. long, 2 in. broad.....10. *Perrottetii*.

Leaves all alternate, thinly coriaceous, ovate or orbicular; caudate-acuminate, acute or rounded at base, glabrous, 3—5-ribbed, the side ribs prolonged to the apex, 3—5 in. long, 1.5—3 in. broad, shortly petioled; flowers minute, in short axillary pedunculate pubescent cymes about 1 in. long.....11. *caudatum*.

1. *CINNAMOMUM GRACILE*, Hook. f.; F. B. I. v. 133.

W. Ghâts, evergreen forests of Tinnevely and Travancore, at 2,500—5,000 ft.

A small straggling shrub, the berry apparently depressed globose.

2. *CINNAMOMUM RIPARIUM*, Gamble in Kew Bull. 1925, 128.

W. Ghâts, from below Coorg to the Anamalais and N. Travancore, on river banks in the low country (Bourdillon).

A graceful little tree with bright blue shining ovoid berry, .5 in. long (*C. gracile*, Bourd. Trav. Trees 302, not of Hook. f.).

3. CINNAMOMUM TRAVANCORICUM, Gamble in Kew Bull. 1925, 128.
W. Ghâts, evergreen forests near Chimunji, Travancore, at 4,000 ft. and upwards (Bourdillon).
A small or medium-sized tree reaching 30 ft. in height and 10 in. in diam. of trunk. Berry ovoid, purplish-blue, 5 in. long (*C. sulphuratum*, Bourd. Trav. Trees 302, *not of* Nees).
4. CINNAMOMUM INERS, Reinw.; F. B. I. v. 130; Wt. Ic. II. 122 bis, 130.
W. Ghâts from Mysore and Coorg to the Anamalais and Travancore, in evergreen forests, up to about 4,000 ft.; Carnatic, Shevaroy Hills of Salem and Kollimalai Hills of Trichinopoly. A large or medium-sized tree with coriaceous shining long leaves and ovoid berry, the fruiting perianth not ribbed.
5. CINNAMOMUM ZEYLANICUM, Blume; F. B. I. v. 131; Wt. Ic. I. 123.
W. Ghâts from S. Canara southwards, at low levels, sometimes cultivated. Cinnamon.
A moderate-sized tree. Bark brown, rough; wood light red, moderately hard, somewhat scented but not used. When cultivated for its bark it is usually, as in Ceylon, grown in coppice, hence the shape of the leaves in specimens is rather variable. Berry ovoid, dark purple, the persistent perianth ribbed. Vern. *Hind.* Dalchini; *Tam.* Karruwa; *Tel.* Sanalinga; *Mal.* Karuva.
6. CINNAMOMUM LITSEAEFOLIUM, Thw.; F. B. I. v. 133.
W. Ghâts, hills of Tinnevely (Tadulingam), without locality (Beddome), Coimbatore (Brandis).
A tree with long-petioled leaves obscurely ribbed and nerved.
- ✓ 7. CINNAMOMUM WIGHTII, Meissn.; F. B. I. v. 132.
W. Ghâts, Coorg, Nilgiris, Anamalais and Pulneys, in Shola forests, above 6,000 ft., most common at the highest levels as about Ootacamund.
A stout tree with very coriaceous leaves and ovate-oblong berries supported by a truncate cup; these berries are frequently diseased and then become globose.
8. CINNAMOMUM MACROCARPUM, Hook. f.; F. B. I. v. 133. *C. iners*, Wt. Ic. I. 130?
W. Ghâts, Sispara and other places in Nilgiris at about 6,000 ft. (Lawson, Gamble); Iyerpadi in Coimbatore (Barber).
A tree with coriaceous shining leaves and large globose-oblong berry reaching nearly 1 in. in length and supported by a large thickened cup and pedicel. The 4th row staminodes usually bear glands like the 3rd row stamens.
- ✓ 9. CINNAMOMUM SULPHURATUM, Nees; F. B. I. v. 132.
W. Ghâts, Coorg and Mysore to N. Coimbatore, Nilgiris and Anamalais, in Shola forests at about 4,000—6,000 ft.
A tree with pale yellowish branches and leaves, the ellipsoid berry 5—75 in. long, seated on the persistent perianth with spreading lobes. Specimens from high levels have usually shorter and more rounded leaves.
10. CINNAMOMUM PERROTTEII, Meissn.; F. B. I. v. 134.
W. Ghâts, Nilgiri Hills, in Shola woods, above 6,000 ft.

short; lobes 6, subequal or the outer slightly the smaller, spreading or reflexed in fruit. *Stamens* 9 perfect, those of the 2nd row opposite the perianth-lobes, introrse, with long filaments and a pair of stipitate glands at their base; stamens of the 3rd row opposite the 1st row, extrorse, with slender filaments and a pair of stipitate glands at their base; staminodes of the 4th row opposite the 2nd row, cordate, stipitate; anthers 4-celled. *Ovary* sessile, style slender; stigma small or discoid. *Fruit* an ovoid ellipsoid or globose, seated on the scarcely enlarged perianth, which is reflexed, pedicel not enlarged. *Seed* conform to the fruit; testa thin; cotyledons fleshy.

MACHILUS MACRANTHA, Nees; F. B. I. v. 140; Wt. I. Bedd. Fl. t. 264. *M. glaucescens*, Wt. Ic. t. 1825.

N. Circars, hills of Vizagapatam, about 4,000 ft (Lushington); Deccan, in hill country as at Nandidrú and the forests of North Coimbatore; W. Gháts, in districts from S. Canara and Coorg to Nilgiris Anamala and hills of Travancore, in evergreen forests up to 10,000 ft. A large evergreen tree with flowers in subterminal panicles. Leaves variable in size from elliptic-oblong, rounded ends, to oblong-lanceolate acute, glaucous beneath. Fruit in size variable as represented in Wight's two plates. Bark black, globose, .5--.75 in. in diam. Bark pale brown, reddish-white darkening on exposure, rough, used for medicinal and other purposes. Vern. Tam. Kolla mávu; Kan. Mal. Urávu; Badaga Kroma.

7. *Phoebe*, Nees.

Evergreen shrubs or trees. *Leaves* alternate, often fascicled at the ends of the branchlets, penninerved; leaf-buds ovate or lanceolate, covered with a few scales. *Flowers* hermaphrodite or rarely polygamous, in terminal or subterminal panicles. *Perianth*-tube short; lobes 6, subequal or the outer slightly the smaller, spreading or reflexed in fruit and clasping its base. *Stamens* 9, perfect, those of the 1st and 2nd row introrse eglandular, the filaments slender; stamens of the 3rd row opposite the 1st row extrorse with 2 large stipitate glands at their base; staminodes of the 4th row opposite the 2nd row, cordate, stipitate; anthers 4-celled. *Ovary* sessile, usual style slender; stigma discoid. *Fruit* an ovoid ellipsoid or globose, seated on the erect and persistent enlarged perianth-lobes, which is reflexed, pedicel not enlarged. *Seed* conform to the fruit; testa thin; cotyledons fleshy.

Branchlets, leaves and inflorescence glabrous; flowering peduncles 1-2 in. long, elongating in fruit, collected usually in the uppermost axils; leaves long acuminate, long cuneate at base, up to 10 in. long and about 1 in. broad, glabrous, usually glaucous beneath, with a few transverse nervules distant; berry black, narrowly ellipsoid, glabrous, up to .5 in. long. 1. Branchlets, leaves beneath and inflorescence minutely grey-puberulous; flowering peduncles very slender, 3-4 in. long, usually lateral from the base of the uppermost axils; leaves oblanceolate, long-acuminate, cuneate at base, up to 9 in. long, 3.5 in. broad, usually glaucous beneath, with a few transverse nervules distant; berry ovoid, .3 in. long. 2. Branchlets, leaves beneath and inflorescence rusty-tomentose; flowering peduncles 1-2 in. long, both axillary and lateral near the ends of the branchlets; leaves elliptic or obovate, acuminate, cuneate at base, up to 6 in. long,

A small tree or (perhaps) shrub with coriaceous leaves, often concave when old, much fulvous tomentose on leaves and branchlets. Berry ovoid, about .5 in. long, seated on the perianth cup with reflexed lobes.

11. *CINNAMOMUM CAUDATUM*, Nees; F. B. I. v. 134.

N. Circars, Mahendragiri Hill in Ganjam at 4,500 ft. (Gamble), hills of Vizagapatam, at 4,500 ft. (A. W. Lushington).

A small tree, the berries ovoid about .5 in. long, seated on the enlarged perianth-tube, the lobes recurved. The inner perianth-lobes are smaller than the outer.

C. Camphora, Nees, is the Camphor tree of Japan, sometimes cultivated in India, though scarce in Madras.

5. *Alseodaphne*, Nees.

* Evergreen trees. *Leaves* alternate, often crowded at the ends of the branchlets, penninerved. *Flowers* small, hermaphrodite, in axillary or subterminal panicles. *Perianth*-tube short, continuous with the pedicel; lobes 6, subequal, or the 3 outer rather the smaller. *Stamens* 9 perfect, those of the 1st and 2nd rows opposite the perianth-lobes, introrse, those of the 3rd row opposite the 1st row, extrorse, with 2 rather large glands on the inner bases of the filaments, staminodes of the 4th row opposite the 2nd row, cordate, stipitate; anthers all 4-celled. *Ovary* ovoid or globose; style slender; stigma peltate. *Fruit* an ellipsoid or globose berry seated on the top of the enlarged thick fleshy often warted peduncle, the perianth-lobes scarcely enlarged and usually persistent. *Seed* conform to the fruit; cotyledons fleshy.

1. *ALSEODAPHNE SEMECARPIFOLIA*, Nees; F. B. I. v. 144; Wt. Ic. t. 1826.

W. Gháts, S. Canara and Malabar, in evergreen forests, at rather low levels.

A large or moderate-sized tree with many branches, the leaves elliptic-oblong or obovate, rounded or emarginate at apex, cuneate at base, often glaucous beneath, minutely reticulate, up to 6 in. long, 3 in. broad; peduncles in fruit rough; berry ellipsoid, smooth, .5—.75 in. long. Bark yellowish-brown; wood dark brown, moderately hard, said to be useful.

Var. *angustifolia*, Meissn. Leaves elliptic-oblong or lanceolate, glaucous beneath.

W. Gháts, lower Pulney Hills (Bourne).

Var. *parvifolia*, Hook. f.; Wt. Ic. t. 1827; Bedd. Fl. t. 297. Leaves obovate or oblanceolate, 2—3 in. long, very glaucous beneath and black when dry, the panicles short, the fruit large.

W. Gháts, Pulney Hills, Sirumalai hills of Madara and Hills of Travancore at about 4,000—5,000 ft.

6. *Machilus*, Nees.

Evergreen trees, leaf-buds perulate with imbricate scales. *Leaves* alternate, penninerved, reticulate. *Flowers* small or moderate-sized, hermaphrodite, in panicles from upper axils. *Perianth*-tube usually

short; lobes 6, subequal or the outer slightly the smaller, persistent, spreading or reflexed in fruit. *Stamens* 9 perfect, those of the 1st and 2nd row opposite the perianth-lobes, introrse, with long filaments, those of the 3rd row opposite the 1st row, extrorse, with slender filaments and a pair of stipitate glands at their base; staminodes of the 4th row opposite the 2nd row, cordate, stipitate; anthers 4-celled. *Ovary* sessile, style slender; stigma small or discoid. *Fruit* a globose or oblong berry seated on the scarcely enlarged perianth, whose lobes are reflexed, pedicel not enlarged. *Seed* conform to the fruit; testa thin.

MACHILUS MACRANTHA, Nees; F. B. I. v. 140; Wt. Ic. t. 1824; Bedd. Fl. t. 264. *M. glaucescens*, Wt. Ic. t. 1825.

N. Circars, hills of Vizagapatam, about 4,000 ft. (A. W. Lushington); Deccan, in hill country as at Nandidrúg, Mysore, and the forests of North Coimbatore; W. Gháts, in most Districts from S. Canara and Coorg to Nilgiris Anamalais, Pulneys and hills of Travancore, in evergreen forests up to 7,000 ft. A large evergreen tree with flowers in subterminal panicles. Leaves variable in size from elliptic-oblong, rounded at both ends, to oblong-lanceolate acute, glaucous beneath. Flowers also in size variable as represented in Wight's two plates. Berry black, globose, .5—75 in. in diam. Bark pale brown; wood reddish-white darkening on exposure, rough, used for planking and other purposes. Vern. *Tam.* Kolla mávu; *Kan.* Kurma; *Mal.* Urávu; *Badaga* Kroma.

7. *Phoebe*, Nees.

Evergreen shrubs or trees. *Leaves* alternate, often fascicled at the ends of the branchlets, penninerved; leaf-buds ovate or lanceolate with few scales. *Flowers* hermaphrodite or rarely polygamous, in axillary or subterminal panicles. *Perianth*-tube short; lobes 6, subequal, erect and accrescent in fruit and clasping its base. *Stamens* 9, perfect, those of the 1st and 2nd row introrse eglandular, the filaments slender, those of the 3rd row opposite the 1st row extrorse with 2 large stipitate glands at their base; staminodes of the 4th row opposite the 2nd row, cordate or sagittate, stipitate; anthers 4-celled. *Ovary* sessile, usually globose; style slender; stigma discoid. *Fruit* an ovoid ellipsoid or globose berry, seated on the erect and persistent enlarged perianth-lobes. *Seed* conform to the fruit; testa thin; cotyledons fleshy.

Branchlets, leaves and inflorescence glabrous; flowering peduncles 1—2 in. long, elongating in fruit, collected usually in the uppermost axils; leaves lanceolate, long acuminate, long cuneate at base, up to 10 in. long and about 2 in. broad; berry black, narrowly ellipsoid, glabrous, up to .5 in. long.....1. *lanceolata*. Branchlets, leaves beneath and inflorescence minutely grey-puberulous; flowering peduncles very slender, 3—4 in. long, usually lateral from the branches below the uppermost axils; leaves oblanceolate, long-acuminate, cuneate often narrowly at base, up to 9 in. long, 3.5 in. broad, usually glaucous beneath, the nerves and transverse nervules distant; berry ovoid, .3 in. long.....2. *paniculata*. Branchlets, leaves beneath and inflorescence rusty-tomentose; flowering peduncles 1—2 in. long, both axillary and lateral near the ends of the branchlets; leaves elliptic or obovate, acuminate, cuneate at base, up to 6 in. long, 2 in. broad,

nerves rather close, transverse nervules close and prominently parallel; berry ovoid, 3 in. long.....3. *Wightii*.

1. *PHOEBE LANCEOLATA*, Nees; F. B. I. v. 141; Wt. Ic. t. 1821.
W. Gháts, Wynaad, Nilgiris, Anamalais and hills of Travancore, in evergreen forests, at 3,000—5,000 ft., rather scarce.
A medium-sized tree, the young branches usually with yellowish-white bark. Wood greyish white with olive-brown heartwood, hard and close-grained.
2. *PHOEBE PANICULATA*, Nees α ; F. B. I. v. 142 *in part*.
N. Circars, hills of Vizagapatam at 4,500 ft. (A. W. Lushington); Deccan, hills of N. Coimbatore; Carnatic, Kollimalai Hills of Trichinopoly; W. Gháts, Wynaad, Pulney and Sirumalai Hills of Madura, about 3,000—5,000 ft. A tree with nearly black branchlets.
3. *PHOEBE WIGHTII*, Meissn.; Bedd. Fl. t. 192. *P. paniculata*, Nees β ; F. B. I. v. 142 *in part*; Wt. Ic. t. 1820.
W. Gháts, Nilgiris, Anamalais and Pulneys, in Shola forests, above 5,000 ft.; Bababudan Hills of Mysore at 4,500 ft.; Kollimalai Hills of Trichinopoly.
A moderate-sized tree common in Nilgiri sholas. Bark thin, brown; wood brown, smooth, with brown medullary patches.
Vern. *Badaga*, Kumára.

8. *Actinodaphne*, Nees.

Evergreen trees or shrubs. *Leaves* subverticillate, rarely scattered or opposite, sometimes triple-ribbed, penninerved, the leaf-buds with imbricate perulate scales. *Flowers* small, dioecious, in axillary or lateral dense bracteate sessile or peduncled clusters or short racemes bearing bracteateumbellules of usually 5, the bracts imbricate, caducous, the pedicels lengthening after the fall of the bracts. *Perianth-tube* short; lobes 6, subequal. *Stamens* in σ flowers 9, those of the 1st and 2nd row opposite the perianth-lobes, those of the 3rd row opposite those of the 1st, the filaments 2-glandular; anthers all oblong, introrse, 4-celled, filaments slender. *Staminodes* in φ flowers also 9, those of the 1st and 2nd rows spatulate or linear, those of the 3rd row linear and 2-glandular. *Ovary* in φ flowers ovoid attenuate into the style; stigma dilated; in σ flowers 0 or a pistillode. *Fruit* a berry resting on the enlarged hardened flat or concave perianth-tube, the lobes persistent or deciduous. *Seed* with thin testa; cotyledons thick, usually hemispheric.

Leaves comparatively small, usually under 6 in. long and at most 1.5 in. broad, coriaceous, more or less glaucous beneath, whorled, minutely reticulate:—

Leaves lanceolate, acuminate; φ flowers in sessile umbels; fruiting perianth with persistent lobes:—

Leaves up to 5 in. long, innovations fulvous-silky, midrib and petiole fulvous-tomentose, main nerves short, about 12—15 pairs.....1. *salicina*.

Leaves up to 4 in. long, innovations dull rusty-tomentose, midrib, petiole and leaf margins when young fulvous-tomentose, main nerves 8—10 pairs, curved.....2. *lanata*.

Leaves elliptic or oblong, acute or obtuse at apex, acute at base, up to 2.5 in. long, 1 in. broad, innovations fulvous-villous or -silky but mature leaves glabrous; fruiting perianth with deciduous lobes.....3. *campanulata*.

Leaves comparatively large, usually more than 6 in. long and 1·5 in. broad,
 chartaceous.

1. *LAUREL* with the lowest pair of main nerves usually opposite, subtriple-nerved:—

Lowest pair extending two-thirds up the blade, other nerves from the midrib about 3—4 pairs, leaves elliptic, shortly acuminate, cuneate at base, fulvous-tomentose as are the branchlets, petioles and inflorescence, up to 5 in. long, 2 in. broad.....4. *Bourneae*.

Lowest pair only shortly prolonged, scarcely to one-third of the blade, other nerves about 10 pairs, leaves oblong-lanceolate, acute at both ends, glabrous, glaucous beneath, up to 9 in. long, 2·5 in. broad.....5. *madraspatana*.

Leaves penninerved, the lowest pair not opposite:—

Leaves oblong-lanceolate or -oblanceolate, acuminate at both ends, the nerves very oblique, in whorls of 7—10, up to 9 in. long, 2·5 in. broad, under-surface softly grey- or cinnameous-tomentose; ♀ fruiting flowers in peduncled umbels.....6. *Bourdillonii*.

Leaves obovate, obtuse or obtusely acute at apex, long-cuneate at base, densely rufous-tomentose beneath and on midrib above, also on petiole, branchlets and ♀ inflorescence, up to 6 in. long, 2·5 in. broad, main nerves 8—9 pairs, often branched.....7. *Lawsonii*.

Leaves elliptic-lanceolate, acuminate, attenuate at base, fulvous-villous beneath, up to 10 in. long, 3 in. broad:—

Leaves shining above, thickly villous beneath, the nerves and nervules not prominent; ♀ fruiting flowers with patelliform shallow perianth-tube, the berry globose, 3 in. in diam.....8. *hirsuta*.

Leaves somewhat shining above, sparsely villous beneath between the nerves, the nerves and nervules very prominent; ♀ fruiting flowers with cup-shaped perianth-tube, the berry small (immature).....9. *Tadulingami*.

1. ACTINODAPHNE SALICINA, Meissn.; F. B. I. v. 148.

W. Ghâts, Sispara in Nilgiris, at 5,000—6,500 ft. in Shola forests.
 A tree with narrow slender leaves, the ♂ flowers, and fruit so far not yet known.

2. ACTINODAPHNE LANATA, Meissn.; F. B. I. v. 149.

W. Ghâts, Nilgiri Hills (Wight, Gamble), at about 5,000—6,000 ft. in Shola forests.
 A tree with lanceolate leaves and a black globose berry about 3 in. in diam., the ♂ flowers not yet known.

3. ACTINODAPHNE CAMPANULATA, Hook. f.; F. B. I. v. 148. *A. salicina*, Bedd. Fl. t. 295, not of Meissn.

W. Ghâts, hills of Tinnevely, at 4,000 ft. (Beddome, Hooper and Ramaswami).

A medium-sized tree (Bedd.), apparently a shrub (Hook. f.), with a globose berry about 25 in. in diam.

Var. *obtusa*, Gamble. Leaves narrower, about 7 in. broad, oblong, obtuse at apex, nearly black when dry. An elegant little tree up to 30 ft. high (Bourdillon).

W. Ghâts, evergreen forests of Travancore at 3,000—4,000 ft. (Bourdillon).

4. ACTINODAPHNE BOURNEAE, Gamble in Kew Bull. 1925, 128.

W. Ghâts, Sholas of the Pulneys Hills about Kodaikanal, 6,000 ft. (Bourne).
 A small tree.

5. ACTINODAPHNE MADRASPATANA, Bedd. ex. Hook. f.; F. B. I. v. 149.

A. Hookeri, Meissn., var. *longifolia*. *A. Hookeri*, Bedd. Fl. t. 296, at any rate as for description.

Deccan, Seshachalam Hills of Cuddapah at 3,000 ft. (Wight, Gamble, Fischer); Kambakam Hills of Chingleput at 2,000—2,400 ft. (Fischer); Pulicat Hills (W. Elliot).

A tree with long leaves very white beneath, close to *A. angustifolia*, Nees, of Bengal and Assam (Haines in 'Bot. Bihar and Orissa'), but distinct in fruit and in leaf-venation. Sir W. Elliot's specimen has a leaf 10 in. long, 4 in. broad.

6. *ACTINODAPHNE BOURDILLONII*, Gamble in Kew Bull. 1925, 129.

W. Ghâts, in most Districts from S. Canara to Nilgiris, Anamalais and hills of Travancore, up to 6,000 ft.

A small tree reaching 30 ft. in height, the young leaves quite white (Bourdillon), the wood of no value. The ♂ flowers are in large clusters with concave bracts, usually, like the ♀, pedunculate from the scars of fallen leaves.

7. *ACTINODAPHNE LAWSONII*, Gamble in Kew Bull. 1925, 129.

W. Ghâts, in S.E. Wynaad, about 4,000 ft. (Lawson).

Apparently a small tree. A specimen of C. B. Clarke's from Coonoor is probably this and has larger and rather thinner leaves.

8. *ACTINODAPHNE HIRSUTA*, Hook. f.; F. B. I. v. 152. *A. Hookeri*, Bedd. Fl. t. 296, figure only?

W. Ghâts, Wynaad, Anamalais and hills of Travancore, in evergreen forests up to 3,000 ft.

A large tree reaching 60 ft. in height and a diameter of 18 in., the innovations very fulvous-silky.

9. *ACTINODAPHNE TADULINGAMI*, Gamble in Kew Bull. 1925, 130.

W. Ghâts, Canara to Anamalais, Travancore and Tinnevely, in evergreen forests up to 2,000 ft.

A tree, similar to the last but with leaves with very different nervation.

9. *Litsea*, Lamk.

Evergreen, rarely deciduous trees or shrubs. *Leaves* alternate or sometimes opposite, penninerved. *Flowers* dioecious, in umbellules of several together, usually 4—6 but in some cases up to 15, supported by 4—6 or more concave involucre bracts; the umbellules sessile or peduncled in axillary or lateral clusters or in racemes, rarely solitary. *Perianth-tube* in ♂ flowers 0 or very small, in ♀ flowers funnel-shaped; lobes normally 6, sometimes more, sometimes 0 or very early caducous, equal or unequal. *Stamens* in ♂ flowers normally 9 or 12, in four rows, those of rows 1 and 2 usually eglandular, those of row 3 and row 4 when present with 2-glandular filaments; all stamens with 4 cells, the cells introrse or the lower pair lateral; ovary 0 or rudimentary. *Staminodes* in ♀ flowers as the stamens of the ♂ but those of the outer rows clavate or linear, those of the inner rows subulate and 2-glandular; ovary enclosed in the perianth-tube or free; style thick, often curved; stigma dilated, irregularly lobed. *Fruit* a globose ovoid ellipsoid or oblong berry, seated on the enlarged perianth-tube with the more or less thickened pedicel; pericarp usually succulent. *Seed* with thin testa and fleshy cotyledons.

Perianth-lobes incomplete or 0; stamens often many:—

Umbellules solitary, many-flowered, peduncled, with large bracts; leaves elliptic or obovate, acute or acuminate, rounded or narrowed at base, nearly glabrous above, fulvous-tomentose or pubescent beneath, up to 10 in. long, 3—4 in. broad, the main nerves 10—15 pairs; berry depressed globose, black, 4 in. in diam.

1. *deccanensis*.

Umbellules in pedunculate umbels or corymbs, bracts medium-sized; leaves variable, lanceolate elliptic or oblong even ovate or obovate, usually obtuse, obtuse or acute at base, glabrous above except on midrib, glabrous to grey-pubescent beneath, very minutely reticulate, up to 9 in. long, 4 in. broad, the main nerves 8—12 pairs; berry globose, purple, 25 in. in diam.

2. *chinensis*.

Umbellules solitary or in clusters, peduncled, the bracts medium-sized; leaves elliptic oblong or obovate, obtuse or acute, glabrous, prominently scrobiculate, up to 6 in. long, 1.5 in. broad, the main nerves 6—8 pairs; berry globose, 25 in. in diam.

3. *ligustrina*.

Perianth-lobes complete:—

Leaves glabrous beneath or nearly so:—

Umbellules, ♂ solitary peduncled, ♀ in few-flowered peduncled racemes, all glabrous, small; leaves membranous, elliptic-oblong, abruptly acuminate, narrowed at base, glaucous beneath, up to 5 in. long, 2 in. broad, main nerves 6—12 pairs, slender.

4. *venulosa*.

Umbellules long-peduncled, in sessile or short-peduncled umbels, minutely puberulous; leaves subcoriaceous, elliptic-oblong or lanceolate, acute, narrowed at base, glaucous and finely reticulate beneath, up to 10 in. long, 3 in. broad, main nerves about 12 pairs, irregular.

5. *laeta*.

Umbellules subsessile, in axillary or lateral clusters:—

Leaves subcoriaceous, elliptic-obovate or lanceolate, shortly acute, narrow at base, very minutely puberulous beneath, up to 6 in. long, 1.5 in. broad, the main nerves 6—7 pairs, obscure.

6. *coriacea*.

Leaves oblong-lanceolate, acuminate, narrowed at base, glabrous or very minutely puberulous and reticulate beneath, up to 7 in. long, 1.5 in. broad, the main nerves about 10—12 pairs.

7. *laevigata*.

Leaves narrowly linear-lanceolate, acuminate at both ends, glabrous and reticulate beneath, up to 4.5 in. long, 1 in. broad, the main nerves 6—7 pairs.

8. *mysorensis*.

Umbellules in racemes:—

Leaves black when dry, coriaceous, quite glabrous as are the racemes, long- (75 in.), petioled, elliptic, obtusely acute or acuminate, narrowed at base, up to 5 in. long, 2 in. broad, main nerves 9—12 pairs, scarcely visible

9. *nigrescens*.

Leaves reddish-brown beneath when dry, greenish above:—

Leaves very coriaceous, quite glabrous, thick-petioled, elliptic, elliptic-oblong or lanceolate, obtuse or acute at apex, narrowed or rounded at base, up to 6 in. long, 2.5 in. broad, main nerves 8—12 pairs, not prominent; berry depressed globose, 1 in. in diam. on a short flattened undulate perianth-tube, the pedicel very thick.

10. *oleoides*.

Leaves coriaceous, glabrous, elliptic- or lanceolate-oblong, acute or acuminate, narrowed at base, up to 8 in. long, 2.5 in. broad, main nerves 8—12 pairs prominent; berry ellipsoid, .5 in. long, seated on the cup-shaped perianth-tube.

11. *Stocksii*.

Leaves coriaceous, glabrous, often very red beneath, elliptic- or linear-oblong, acute, narrowed at base, up to 6 in. long, 2 in. broad, main nerves 10—12 pairs, prominent; berry (not ripe) ovoid, seated on the obconic perianth-tube.

12. *glabrata*.

Leaves white-glaucous beneath when dry:—

Leaves elliptic-obovate or lanceolate-oblong, obtuse or acute, narrowed at base, glabrous, or pubescent only on the nerves when young, up to 7 in. long, 2.5 in. broad, but usually smaller, the 7—10 pairs of main nerves very faint; berry ellipsoid, nearly .5 in. long, seated on the cup-shaped perianth-tube with thick pedicels.

Stocksii var. *glabrescens*.

Leaves linear-oblong or lanceolate, obtuse or acute, up to 3.5 in. long, .75 in. broad, the main nerves 8—10 pairs rather close and prominent

13. *Beddomei*.

Leaves pubescent or tomentose beneath:—

Umbellules in sessile or subsessile axillary or lateral clusters:—

Leaves alternate:—

Leaves chartaceous, elliptic or elliptic-oblong or -obovate, obtuse or slightly acute at apex, rounded at base, softly fulvous-pubescent beneath, up to 8 in. long, 4 in. broad, main nerves 8—12 pairs, transverse nervules parallel; berry ovoid or ellipsoid, .3 in. long, on a small recurved flattened perianth-tube.....14. *polyantha*.

Leaves coriaceous, elliptic-oblong or -obovate, obtuse, slightly acute at base, *roughly fulvous-pubescent beneath*, up to 9 in. long, 4.5 in. broad, main nerves 10—12 pairs, transverse nervules parallel and conspicuous; berry ellipsoid, 1 in. long, .6 in. broad, on a deep obconic warted cup .5 in. long.....15. *insignis*.

Leaves subcoriaceous, obovate or obovate-oblong, obtuse and abruptly acute at apex, cuneate at base, minutely fulvous-pubescent beneath, up to 9 in. long, 4 in. broad, main nerves 12—18 pairs, closer towards the base; berry oblong, .5 in. long, on a cup-shaped 2—4-cleft glabrous, usually sessile perianth-tube.....16. *Bourdillonii*.

Leaves usually opposite at the ends of the branchlets, alternate lower down, membranous, oblong or obovate, acuminate, fulvous pubescent beneath, especially on the nerves, up to 7 in. long, 2 in. broad, main nerves 8—12, looped to join near the margin, berry globose, on a cup-shaped, shortly lobed perianth-tube.....17. *travancorica*.

Umbellules in racemes:—

Leaves comparatively small, obovate elliptic or lanceolate, obtuse or rarely acute, fulvous-pubescent beneath, especially on the nerves, sometimes nearly glabrous, up to 4 in. long, 2 in. broad, main nerves 4—8 pairs prominent, the transverse nervules obscure; berry ovoid, .4—5 in. long, seated on the cup-shaped perianth-tube, the pedicel thickened.....18. *Wightiana*.

Leaves large, elliptic or obovate-oblong, acute or acuminate, densely fulvous-tomentose beneath, up to 10 in. long, 4 in. broad, main nerves 10—15 pairs, prominent as are the transverse nervules; berry oblong, .5—7.5 in. long, seated on the turbinate perianth-tube with thick pedicel.....19. *floribunda*.

1. LITSEA DECCANENSIS, Gamble n. comb. *L. tomentosa*, Heyne; F. B. I. v. 157. *Tetranthera tomentosa*, Roxb.; Wt. Ic. t. 1834.

Deccan, in the hills of Cuddapah, Mysore and Chittoor at about 2,000—4,000 ft.; Carnatic, hills of S. Arcot, Salem and Trichinopoly; W. Ghâts, in all Districts, in rather dry forests at 3,000—6,000 ft.

A moderate-sized tree with soft grey or tawny branchlets and leaves. The wood is said to be yellowish and likely to be useful. Vern. *Mar.* Chikua; *Tel.* Naramamidi; *Tam.* Perumbandali.

2. LITSEA CHINENSIS, Lamk. *L. sebifera*, Pers.; F. B. I. v. 157. *Tetranthera apetala*, Roxb. Cor. Pl. t. 147.

N. Circars, from Ganjam to the Godavari, in hill forests; Deccan, in the hills of Nellore (Ramaswami) and Cuddapah (Gamble), very scarce in the forests of the W. Ghâts.

A moderate-sized tree with thin leaves of variable size, shape and pubescence. Bark brown; wood greyish-brown, moderately hard. Vern. *Hind.* Maida; *Tel.* Narra alagi.

3. LITSEA LIGUSTRINA, Hook. f.; F. B. I. v. 158. *Tetranthera ligustrina* Nees; Wt. Ic. t. 1835.

Deccan, hills of N. Coimhatore, 2,000—5,000 ft.; W. Ghâts, Nilgiris, Pulneys and hills of Tinnevely, especially Nilgiris on E. side, at 3,000—6,000 ft.

A small tree, with glabrous very reticulate leaves.

4. *LITSEA VENULOSA*, Hook. f.; F. B. I. v. 161.
W. Gháts, hills of Tinnevely about Courtallum, 3,000—4,000 ft. (Wight, Beddome).
A straggling evergreen shrub.
5. *LITSEA LAETA*, Wall.; F. B. I. v. 169.
N. Circars, Mahendragiri in Ganjam, at 4,000 ft. (Gamble), Rampa Hills at 2,500 ft. (Gamble).
A small tree, the berry globose, seated on a turbinate enlarged perianth-tube nearly 5 in. in diam.
6. *LITSEA CORIACEA*, Hook. f.; F. B. I. v. 166.
W. Gháts, S. Canara, Coorg, Wynaad, Anamalais and evergreen forests of Travancore, up to 4,000 ft.
A small tree with leaves often green above, dull grey beneath when dry, the branchlets puberulous, the umbellules grey-silky in bud, the berry small, ovoid, in a cup-shaped perianth-tube.
Vern. *Tam.* Panni thali; *Mal.* Maravetti thali.
7. *LITSEA LAEVIGATA*, Gamble n. comb. *Tetranthera attenuata* var. *laevigata*, Nees, Syst. Laur. 677.
W. Gháts, in the Tinnevely Hills about Courtallum (Wight); hills of Mysore at 2,000 ft. (Meebold).
A tree with leaves when dry green above, reddish brown beneath, the branchlets pale, the umbellule bracts grey silky, the berry oblong in a small obconic perianth-tube.
8. *LITSEA MYSORENSIS*, Gamble in Kew Bull. 1925, 130.
W. Gháts, hills of Mysore at 3,000—4,000 ft. (Meebold), Wynaad (Beddome).
A small or medium-sized tree with very small sessile clusters of umbellules.
9. *LITSEA NIGRESCENS*, Gamble n. comb. *Tetranthera Panamanja*, Wt. Ic. t. 1836, *not of* Buch.-Ham.
W. Gháts, hills of Tinnevely and Travancore, at low levels (Wight, Bourdillon).
A moderate-sized tree, the racemes 1.5 in. long, the fruit not known.
10. *LITSEA OLEOIDES*, Hook. f.; F. B. I. v. 175.
W. Gháts, Nilgiris, Anamalais and hills of Travancore, above 4,000 ft. in evergreen forests, especially common in S. Nilgiri sholas towards Sispara.
A large tree with thick leaves, the racemes fulvous pubescent, about 2 in. long. The uppermost leaves are sometimes opposite.
11. *LITSEA STOCKSII*, Hook. f.; F. B. I. v. 176.
W. Gháts, Nilgiris, Anamalais and hills of Travancore, at 2,000—6,000 ft. in evergreen forests.
A small tree, the racemes usually short and few-flowered, silky pubescent.
Var. *glabrescens*, Hook. f. Leaves very white beneath.
W. Gháts, in Nilgiris, on W. side, Naduvatam to Sispara, at 4,000—6,000 ft.
A small tree.

12. *LITSEA GLABRATA*, Hook. f.; F. B. I. v. 178.
W. Gháts, Nilgiris and Pulneys, above 6,000 ft., in Shola forest;
Bababudan Hills of Mysore at 5,000 ft. (Meebold).
A tree.
13. *LITSEA BEDDOMEI*, Hook. f.; F. B. I. v. 177.
W. Gháts, hills of Tinnevely and Travancore about 4,000 ft.,
in evergreen forests (Beddome, Bourdillon, Barber).
A small tree with small leaves and short flower-racemes.
14. *LITSEA POLYANTHA*, Juss.; F. B. I. v. 162. *Tetranthera monopetala*,
Roxb. Cor. Pl. t. 148; Brand. For. Fl. t. 45.
N. Circars, hills of Ganjam and Vizagapatam, at 3,000—4,000 ft.
(A. W. Lushington); hills of Godavari (Gamble, Herb-Madr.),
usually in shady places and ravines.
A moderate-sized evergreen tree with soft leaves when young,
and not very conspicuous transverse nervules 1 in. apart.
Bark dark grey, smooth, scaly; wood olive-grey, soft, not much
used. Vern. *Hind.* Maida; *Ur.* Mosonea.
15. *LITSEA INSIGNIS*, Gamble in Kew Bull. 1925, 130.
W. Gháts, Anamalai Hills (Barber), hills of Travancore, at low
levels up to 1,000 ft. (Bourdillon) in evergreen forests.
A lofty tree with yellowish flowers in great quantity on the old
wood, leaving tubercles. The leaves are thick and the parallel
transverse nervules 2 in. apart, the fruit and its cup very large.
16. *LITSEA BOURDILLONII*, Gamble in Kew Bull. 1925, 131.
W. Gháts, Anamalais and hills of Travancore, at 2,500—6,000 ft.
in evergreen forests.
A moderate-sized or large tree with the flowers, both ♂ and ♀,
in dense tufts on the branchlets, axillary or lateral. The
usually close main nerves of the obovate leaves are
characteristic.
17. *LITSEA TRAVANCORICA*, Gamble in Kew Bull. 1925, 132.
W. Gháts, hills of Travancore, in evergreen forests (Lawson,
Venkoba Row).
A tree.
18. *LITSEA WIGHTIANA*, Hook. f.; F. B. I. v. 117 in part. *Cylicodaphne*
Wightiana, Nees; Wt. Ic. t. 1833.
W. Gháts, Nilgiri Hills, above 6,000 ft., in Shola forests, com-
mon; hills of Travancore and Tinnevely, above 4,000 ft., in
evergreen forests, less so.
A large evergreen tree with tawny branchlets and foliage.
Bark light brown, smooth, with somewhat horizontal lenticels;
wood yellowish brown, hard; apparently only used for fuel.
Vern. *Badaga* Keynjee.
Var. *tomentosa*, Meissn. Leaves oblong-lanceolate, acuminate,
narrower and with more (up to 10) pairs of main nerves, the berry
larger, the cup deeper.
W. Gháts, Anamalais and Pulney Hills, above 6,000 ft., com-
mon; Nilgiris scarce.

19. *LITSEA FLORIBUNDA*, Gamble n. comb. *L. Wightiana*, Hook. f.; F. B. I. v. 177 in part. *Cylicodaphne floribunda*, Bl. in Mus. Bot. Lugd. Bat. i. 387. *Tetranthera Wightiana*, Bedd. Fl. t. 293.

W. Ghâts, in all Districts, at 2,000—6,000 ft., in evergreen forests; Bababudan Hills and hills of W. Mysore and Coimbatore, on Nilgiris chiefly on E. slopes up to Coonoor and Kotagiri.

A large or moderate-sized tree, the ♂ racemes often 3—4 in. long.

10. *Neolitsea*, Merr.

Evergreen trees. *Leaves* alternate opposite or in whorls, triple-ribbed, usually areolate-reticulate; buds perulate. *Flowers* dioecious, in 3—7-flowered umbellules arranged in clusters or short racemes in the axils of the upper leaves or on the branchlets between the nodes, the clusters with small bracts at their bases; involucre bracts 4, deciduous, pedicels elongating. *Perianth*-lobes 4. *Stamens* in ♂ flowers 6, those of the 2 outer rows eglandular, those of the 2 inner biglandular opposite the 1st row; anther-cells all introrse or the lower lateral. *Staminodes* of ♀ flowers 6, arranged as the stamens, usually linear or linear-clavate. *Ovary* ovoid; style thick; stigma usually peltate in ♂ flowers 0 or a small pistillode. *Fruit* a globose or ellipsoid berry seated on the somewhat enlarged perianth-tube and somewhat elongate pedicel; pericarp smooth. *Seed* conform to the fruit, cotyledons hemispheric.

Fruiting perianth very small compared with the berry, about .1 in. in diam:—

Berry oblong, .3—4 in. in diam., on a crenate perianth-tube scarcely .1 in. in diam.; leaves subcoriaceous, glabrous, glaucous beneath, elliptic- or oblong-lanceolate, obtusely acute, up to 4 in. long, 1—1.5 in. broad, nerves from the midrib 2—4 pairs.....1. *zeylanica*.
Berry globose, .5 in. in diam., on a very small entire perianth-tube; leaves very coriaceous, thickly fulvous-villous when young on the ribs and nerves beneath, very white-glaucous, ovate, acuminate, up to 7 in. long, 3 in. broad, nerves from the midrib 3—5 pairs, outside the side ribs about 5—6, all prominent, the transverse nervules parallel.....2. *Fischeri*.

Fruiting perianth rather large compared with the berry, .25 in.:—

Fruiting perianth cup-shaped, entire; berry globose, .3—4 in. in diam.; leaves coriaceous, glabrous, sometimes glaucous beneath, elliptic-ovate or even orbiculate, shortly acute, up to 5 in. long, 3 in. broad, minutely but prominently scrobiculate; nerves from the midrib 2—3 pairs, obscure.....3. *scrobiculata*.
Fruiting perianth patelliform, entire; berry globose, about .25 in. in diam.; leaves chartaceous or subcoriaceous, glabrous, very glaucous beneath when young, ovate or lanceolate, acuminate, up to 7 in. long, 3 in. broad, areolate, nerves from the midrib 2—3 pairs, faint.....4. *foliosa* var. *caesia*.

1. *NEOLITSEA ZEYLANICA*, Merr. *Litsea zeylanica*, Nees; F. B. I. v. 178 in part; Wt. Ic. tt. 132, 1844; Bedd. Fl. t. 294; *L. oblonga*, Nees; Wt. Ic. t. 1845.

N. Circars, Mahendragiri in Ganjam, at 4,000 ft.; Deccan, hills of Mysore and Coimbatore; W. Ghâts, in all Districts, in evergreen and Shola forests, above 2,000 ft.

A small or moderate-sized tree. Bark thick, smooth, grey; wood light brown to yellow, moderately hard, said to have the scent of Sweet Briar (Bedd.).

2. *NEOLITSEA FISCHERI*, Gamble in Kew Bull. 1925, 132.
W. Ghats, Anamalais and hills of Cochin and Travancore, above 6,000 ft., in evergreen forest.
A large tree with large tawny perulate buds and golden fulvous young leaves and shoots. The old leaves are large and very coriaceous with prominent ribs, nerves and transverse nervules. It somewhat resembles *Actinodaphne Hookeri* var. *dasy-poda* but the fruit is different.
3. *NEOLITSEA SCROBICULATA*, Gamble n. comb. *Litsea scrobiculata*, Meissn. in DC. Prodr. xv. i. 223.
W. Ghats, Nilgiris, about 6,000 ft.; hills of Tinnevely.
A tree reaching 50 ft. in height, the leaves long-petioled.
4. *NEOLITSEA FOLIOSA*, Gamble n. comb. *Litsea foliosa*, Nees in Syst. Laur. 622.
Var. *caesia*, Meissn. in DC. Prodr. xv. i. 222.
N. Circars, hills of Vizagapatam, Rampa Hills of Godavari, about 2,000 ft.; Deccan, Seshachalam Hills of Cuddapah, hills of Mysore and Coimbatore; Carnatic, Javadi Hills of S. Arcot; W. Ghats, hills of S. Travancore, all at low levels and up to 5,000 ft. at most.
A tree with long-petioled, usually long-acuminate very glaucous leaves.

11. *Cassytha*, Linn.

Filiform twining parasites, adhering to their host by suckers. *Leaves* consisting of minute scales or 0. *Flowers* small, hermaphrodite, spicate capitate or racemose; bracteoles 3. *Perianth*-tube short and globose or turbinate and as long as the lobes; lobes 6, the 3 outer smaller. Perfect *stamens* 9 or 6, 2-celled; those of the 1st row opposite the outer perianth-lobes introrse, those of the 2nd row opposite the inner, also introrse, sometimes reduced to staminodes; those of the 3rd row opposite the 1st row extrorse, the filaments with a pair of glands at the base; within these and opposite the 2nd row, 3 sessile or stipitate staminodes. *Ovary* globose, free in flower but included in the perianth-tube, which closely covers it in fruit; style short; stigma small or capitate. *Fruit* a drupe enclosed in the enlarged inflated perianth-tube, crowned by the remains of the lobes and stamens; pericarp of 2 layers, the outer thin, the inner thick and hard. *Seed* conform to the drupe; testa thin; cotyledons fleshy, at length confluent.

Stems fairly stout about 1 in. thick where attached to the host, very long and twining cord-like; flowers sessile, in spikes 1.5—2 in. long; drupe globose

1. *filiformis*.
Stems very slender, thread-like; flowers sessile, in very small peduncled heads; drupe oblong ovoid, bluntly 6-angled.....2. *capillaris*.

1. *CASSYTHA FILIFORMIS*, Linn.; F. B. I. v. 188; Wt. Ic. t. 1847.
All plains Districts, on bushes, especially near the coast.
Common on various species of young trees and bushes.
2. *CASSYTHA CAPILLARIS*, Meissn.; F. B. I. v. 188.
Tinnevely District, at Kannikatti (Barher), also in Ceylon.
A rare species, found by Barber on *Apama Barberi*.

Persea gratissima, Gaertn., the Avocado Pear, of the West Indies, is sometimes found in cultivation for its pleasant fruit.

Family CXXVII. HERNANDIACEAE.

Trees or climbing shrubs. *Leaves* alternate, simple or pinnate, entire or lobed; stipules 0. *Flowers* hermaphrodite, monoecious or polygamous, regular, usually small, white or greenish. *Perianth* superior; lobes free or shortly united below in two valvate 3—5-merous whorls or in one imbricate 4—8-merous whorl. *Stamens* 3—5 in one whorl; anthers 2-celled, dehiscing introrsely or laterally by 2 valves; staminodes glandular, in 1 or 2 whorls outside the stamens or absent. *Ovary* inferior, 1-celled; ovule solitary, pendulous, anatropous. *Fruit* dry, often longitudinally ribbed, sometimes with 2—4 longitudinal wings or with 2 terminal wings formed by accrescent perianth-lobes, or else wingless and enclosed in an inflated cupule. *Seed* solitary; albumen 0; cotyledons large, more or less lobed and twisted.

Gyrocarpus, Jacq.

A tall tree with thick branches. *Leaves* alternate, large, long-petioled, entire or lobed, clustered towards the ends of the branches. *Flowers* small, unisexual, ♂ very numerous, ♀ few, also a few hermaphrodite mixed, in large dense ebracteate cymes. *Perianth* in ♂ flowers, 4—7-partite, in ♀ 2-lobed, the lobes enlarged in fruit. *Stamens* 4—7, inserted at the bottom of the perianth, alternating with as many clavate staminodes; anthers 2-celled, dehiscing by valves. *Ovary* 1-celled; ovule 1, pendulous from the apex of the cell; stigma sessile. *Fruit* drupe-like, crowned with the long wing-like persistent perianth-lobes. *Seed* solitary; cotyledons large, convolute.

GYROCARPUS AMERICANUS, Jacq. *G. Jacquini*, Roxb. Cor. Pl. t. 1; Bedd. Fl. t. 196; F. B. I. ii. 461.

N. Circars, especially in Godavari and Kistna, in forests of the E. Ghâts; Deccan and Carnatic, in deciduous forests, extending West to the E. slopes of the W. Ghâts.

A large deciduous tree with large soft leaves often deeply lobed. Bark thin, greyish-white with a silvery lustre; wood soft, grey, in considerable demand for making catamarans, also for boxes, trays and toys. Vern. *Hind.* Zaitun; *Ur.* Pitella; *Tel.* Tanaku.

Family CXXVIII. PROTEACEAE.

Trees or shrubs, rarely herbs. *Leaves* alternate, rarely opposite or verticillate, entire toothed or pinnatisect; stipules 0. *Flowers* capitate spicate racemose or rarely solitary, hermaphrodite, regular or irregular; bracts small, caducous or nearly obsolete, sometimes imbricate, hardened in fruit forming a cone; bracteoles 0—2. *Perianth* inferior; lobes 4, at first valvately connate in a tube with gibbous base, at length more or less separating with recurved tips. *Stamens* 4, on and opposite to the perianth-lobes; anthers erect, the connective continuous with the filaments, cells 2 introrse, dehiscing longitudinally. *Disk* of 4

hypogynous scales, sometimes 0. *Ovary* superior, sessile or stipitate, 1-celled, often oblique; style terminal, thickened at tip; stigma terminal or lateral; ovules solitary or in pairs or many, biseriate. *Fruit* a nut or drupe indehiscent or ultimately opening on the inner edge or at the tip, or a follicle or capsule with often coriaceous valves. *Seeds* solitary or in pairs or few; testa membranous or coriaceous, sometimes winged; albumen 0; cotyledons compressed or fleshy, often unequal; radicle short, inferior or lateral.

Helicia, Lour.

Trees or large shrubs. *Leaves* alternate, entire toothed or pinatisect. *Flowers* in terminal and axillary racemes, hermaphrodite, regular, usually in pairs; bracts small, caducous; bracteoles minute. *Perianth*-tube slender; limb narrow, ovate or oblong, lobes revolute in flower. *Stamens* 4; anthers oblong, connective produced in an apiculus. *Disk* of 4 hypogynous scales, free or connate. *Ovary* sessile; style slender; stigma terminal; ovules 2, basal or lateral, attached below the middle. *Fruit* a subglobose hard nut. *Seeds* 1—2, subglobose or hemispheric; testa rugose or veined; cotyledons fleshy.

Leaves petioled, acute at base, elliptic-oblong, acuminate, coarsely dentate, up to 7 in. long, 3 in. broad; flowers in bud 5—7 in. long

1. *nilagirica*.
Leaves subsessile, rounded at base, obovate-oblong, obtusely acute, entire or distantly serrate, up to 9 in. long, 3.5 in. broad, shining above and reticulate; flowers in bud 7—1 in. long.....2. *travancorica*.

1. *HELICIA NILAGIRICA*, Bedd.; F. B. I. v. 190.

W. Gháts, Walaghát in Malabar at 3,000 ft. (Beddome); Devála in S.E. Wynaad at 3,000 ft. (Gamble), in evergreen forests.

A small tree with chartaceous leaves and globose purple fruit .5 in. in diam.

2. *HELICIA TRAVANCORICA*, Bedd.; F. B. I. v. 191. *H. robusta*, Bedd. Fl. t. 301, not of Wall.

W. Gháts, hills of Tinnevely and Travancore, at 4,000 ft. on the banks of streams (Bedd.).

A handsome tree of good size with coriaceous leaves and greenish-yellow flowers, the fruit globose, .75 in. in diam.

Several species of chiefly Australian Proteaceous shrubs are in cultivation in the Botanic Gardens in the Nilgiris. *Grevillea robusta*, A. Cunn., the Silk Oak, a moderate-sized handsome tree of Australia, has been much cultivated in S. India, both in the forests for its handsome prettily grained wood, and in tea estates as a shade plant. It is so far acclimatized that it reproduces itself naturally from seed.

Family CXXIX. THYMELAEACEAE.

Shrubs or trees with rough fibrous bark, rarely herbs. *Leaves* alternate or opposite, simple, entire. *Flowers* usually hermaphrodite, in axillary or terminal heads umbels clusters or racemes; bracts various, often forming an involucre. *Perianth* regular, tubular or

campanulate, often corolline, 4—5-lobed, the lobes imbricate in bud, often with scales at their bases within. *Stamens* as many or twice as many as the lobes of the perianth, those opposite the lobes usually attached above the alternate ones; filaments short; anthers erect, 2-celled, dehiscing longitudinally. *Disk* hypogynous, annular cupular or of scales, sometimes 0. *Ovary* superior, 1—2-celled; ovule 1 in each cell, anatropous, pendulous from the apex of the cell; style short or long, terminal or excentric; stigma usually capitate. *Fruit* a small berry drupe or capsule. *Seed* solitary or one in each cell, pendulous or lateral; testa crustaceous, rarely membranous; albumen fleshy or 0; cotyledons fleshy, usually thick; radicle short, superior.

Ovary 1-celled, 1-ovuled; fruit indehiscent; flowers in close bracteate heads; stamens 10.....1. *Lasiosiphon*.
Ovary 2-celled, cells 1-ovuled; fruit a loculicidal capsule; flowers in small ebracteate umbels; stamens 5.....2. *Gyrinops*.

1. *Lasiosiphon*, Fresen.

Silky shrubs. *Leaves* opposite or alternate and scattered. *Flowers* hermaphrodite, in dense heads with broad bracts. *Perianth*-tube cylindric, circumscrib above the ovary; lobes 5, spreading; scales above the stamens 5, alternate with the perianth-lobes. *Stamens* 10 in 2 rows, the upper or all shortly exserted; anthers oblong or linear. *Disk* 0 or short, annulate. *Ovary* sessile, 1-celled; style filiform; stigma capitate. *Fruit* small, dry, included in the base of the perianth, pericarp membranous. *Seed* conform to the pericarp; testa crustaceous; albumen scanty or 0.

LASIOSIPHON ERIOCEPHALUS, DCNE.; F. B. I. v. 197. *Gnidia eriocephala*, MEISSN.; Wt. Ic. t. 1859.

W. Ghâts, in all Districts, at 4,000—7,000 ft. in open forests.

A small tree or large shrub with linear-oblong leaves and bright yellow flowers in dense terminal white silky heads surrounded by an involucre of silky bracts. Bark grey, smooth, the inner bark fibrous; wood white or yellowish-white, hard. Vern. *Tam.* Nacchi nár; *Mal.* Nanju.

Var. *sisparensis*. *Gnidia sisparensis*, MEISSN.; Wt. Ic. t. 1860. *Leaves* obovate obtuse subsessile; heads with fulvous hairs.

Sispara in Nilgiris (Gardner); Palghát Hills (Beddome); Mysore (Lobb.).

2. *Gyrinops*, Gaertn.

Small trees. *Leaves* alternate, shining, the lateral nerves very fine, numerous and parallel. *Flowers* hermaphrodite, in terminal and axillary few-flowered, umbels, ebracteate, bracteoles small. *Perianth*-tube slender; lobes 5, spreading; scales above the stamens connate in a ring. *Stamens* 5, in one row at the mouth of the perianth-tube and opposite the lobes; anthers subsessile. *Ovary* stalked, 2-celled; ovule 1 in each cell; style subulate; stigma ovoid. *Fruit* a stipitate compressed ovoid capsule; loculicidally 2-valved. *Seeds* ovoid, with a tail-like basal appendage; testa crustaceous; albumen 0.

GYRINOPS WALLA, Gaertn.; F. B. I. v. 199; Wt. Ic. t. 1850; Bedd. Fl. t. 303.

Tinnevely (Beddom), a Ceylon plant.

A small tree with yellowish foliage, the leaves oblong, obtusely acuminate, 2—4 in. long, about 1 in. broad, with close minute parallel nerves.

Wikströmia viridiflora, Meissen. is a Malay shrub, cultivated in gardens in Madras.

Family CXXX. ELAEAGNACEAE.

Trees or shrubs, often thorny, with numerous silvery or coppery scales on the branches inflorescence and under-surface of the leaves especially. *Leaves* alternate or opposite, entire; stipules 0. *Flowers* small, regular, hermaphrodite or dioecious, solitary or in axillary fascicles spikes or racemes; bracts small, deciduous. *Perianth* in hermaphrodite or ♀ flowers tubular, constricted above the ovary, persistent below, deciduous above, limb 2—4-lobed; in ♂ flowers reduced to a 2—4-lobed limb. *Stamens* in hermaphrodite flowers adnate to the throat of the perianth-tube, as many as the lobes and alternate with them, in ♂ flowers to perianth-base, twice as many as the lobes; filaments free; anthers oblong, 2-celled, the cells dehiscing longitudinally. *Ovary* free, 1-celled; style filiform; stigma lateral; ovule 1, basal, erect, anatropous. *Fruit* a nut, closely covered by the thickened perianth-base, pericarp membranous. *Seed* erect; testa hard; albumen scanty or 0; cotyledons thick, fleshy; radicle inferior.

Elaeagnus, Linn.

Trees or shrubs, often thorny, with silvery or stellate scales. *Flowers* hermaphrodite, axillary, solitary or in fascicles or racemes. *Perianth*-tube campanulate or funnel-shaped, narrowed above the ovary; lobes 4, valvate, deciduous. *Stamens* 4, on the mouth of the perianth, on a ring, alternate with the lobes. *Ovary* 1-celled; style linear; stigma lateral. *Fruit* a nut enclosed in the thickened perianth-base. *Seed* with hard shining testa.

Scales very shining, silvery only; flowers small, the perianth-tube narrowly cylindrical, the clusters few-flowered only; leaves thin, elliptic-lanceolate, up to 3 in. long, 1.5 in. broad, acute at apex, 5—6-nerved; drupe small, ellipsoid-oblong, 3—6 in. long, the putamen grooved.....1. *indica*.

Scales shining or dull, silvery and coppery, usually mixed; clusters many-flowered:—
Leaves rather large, up to 8 in. long, 3 in. broad, thin, elliptic or elliptic-oblong or obovate, acute or acuminate at apex, 5—6-nerved; perianth-tube urceolate, 2—3 in. long; drupe large, oblong, 5—1 in. long, the putamen grooved

2. *conferta*.

Leaves medium-sized, 2—3 in. long, 1.5—2 in. broad, thick, ovate or ovate-oblong or orbicular, obtuse or rarely acute at apex, usually rounded at base, 3—4-nerved; perianth-tube broadly urceolate, 2—3 in. long; drupe oblong-ellipsoid, 5—7.5 in. long.....3. *Kolaga*.

1. *ELAEAGNUS INDICA*, Servetaz in Bull. Herb. Boiss., ser. 2, viii. 393.
Deccan, hills of N. Coimbatore, to 3,500 ft.; Carnatic, hills of S. Arcot, Salem and Madura, west to E. slopes of W. Ghâts.
A slender straggling shrub.

2. ELAEAGNUS CONFERTA, Roxb. *E. latifolia*, Linn.; F. B. I. v. 202 *in part only*; Brand. For. Fl. t. 46.
N. Circars, hills of Vizagapatam (A. W. Lushington); W. Coast and W. Ghâts, at low levels, but occasionally up to 5,000 ft.
A large often thorny straggling shrub with red edible fruit.
3. ELAEAGNUS KOLOCA, Schlecht. in DC. Prodr. xiv. 611. *E. latifolia*, Linn.; F. B. I. v. 202, *in part only*; Wt. Ic. t. 1856.
W. Ghâts, Nilgiris and Pulneys above 5,000 ft., margins of Shola woods and open scrub forests; Bababudan Hills of Mysore.
A large sometimes thorny straggling or climbing shrub with orange-red edible fruit. Vern. Tam. Kolungai.

Family CXXXI. LORANTHACEAE.

Evergreen shrubs, rarely herbs, usually parasitic on the branches of trees; stems much branched, often jointed. *Leaves* opposite or sometimes alternate, coriaceous, entire, sometimes reduced to scales or 0; stipules 0. *Flowers* regular or zygomorphic, hermaphrodite or unisexual, sometimes large and brightly coloured, sometimes inconspicuous, in racemes spikes heads or fascicles, usually bracteate and often with 2 or more bracteoles. *Calyx* adnate to the ovary; limb annular or cupular, entire or shortly toothed, sometimes 0. *Petals* or perianth-segments 3—8, valvate, free or more or less connate in a tube. *Stamens* as many as and opposite to the petals and more or less adnate to them; filaments slender or 0; anthers basifixed or dorsifixed, opening by longitudinal slits or by rows of cells or by pores. *Ovary* inferior, 1-celled; usually without distinct placenta; style short or long; stigma simple. *Fruit* a 1-seeded berry or drupe with fleshy pericarp and often viscid mesocarp. *Seed* solitary without distinct testa; alhumen fleshy or none; embryo straight, usually fleshy; radicle superior.

Calyx present, though the limb is sometimes reduced to a rim only; flowers hermaphrodite, anthers basifixed:—

- | | |
|---|-------------------------|
| Calyx-tube supported by a bract, no bracteoles..... | 1. Loranthus. |
| Calyx-tube supported by a bract and two bracteoles..... | 2. Elytranthe. |
| Calyx obsolete or represented by a rim; flowers unisexual:— | |
| Anthers 2-celled, opening longitudinally; plants without leaves.... | 3. Korthalsella. |
| Anthers opening by many pores, combined with the perianth-lobes; plants with or without leaves..... | 4. Viscum. |

1. **Loranthus**, Linn. (restricted).

Parasitic shrubs with many branches. *Leaves* opposite or alternate or both, usually thick and fleshy or coriaceous, entire. *Flowers* hermaphrodite, usually coloured, in racemes spikes cymes or fascicles, in the axils of leaves or of the scars of fallen leaves, rarely terminal; bract usually small, supporting the base of the calyx-tube; bracteoles 0. *Calyx*-tube adnate to the ovary, the limb short, truncate or toothed. Corolla polypetalous or gamopetalous, regular or zygomorphic; lobes 4—6, valvate, free or more or less connate in a tube, erect or reflexed, the tube often split down one side. *Stamens* as many as the corolla-lobes and adnate to them; filaments usually slender; anthers basifixed,

usually linear, opening by longitudinal cells, sometimes septate. *Disk* 0. *Ovary* 1-celled; style filiform, sometimes geniculate; stigma entire, obtuse or capitate. *Fruit* baccate, globose ovoid ellipsoid or oblong, crowned by the persistent calyx-limb. *Seed* albuminous, adnate to the pericarp, usually surrounded by glutinous pulp; testa 0; embryo straight; radicle superior.

Corolla lobes free:—

Flowers in spikes, on excavations in a thickened rhachis; leaves coriaceous, opposite or alternate, the innovations mealy-pubescent:—

Leaves lanceolate, obtusely elacuminate at apex, narrowed at base, up to 3 in. long, 1 in. broad, petiole .2—3 in. long; spikes 1—2 in. long; flowers in bud .25 in.1. *Hookerianus*.

Leaves elliptic orbicular or obovate, obtuse at apex, slightly narrowed at base, up to 1.5 in. long, .5—1 in. broad, petiole .1—2 in. long; spikes 1—1.5 in. long; flowers in bud .4 in.2. *Wightii*.

Flowers in racemes, solitary or fascicled on the nodes of old branchlets; leaves coriaceous, opposite or alternate:—

Branchlets, leaves and inflorescence glabrous:—

Flowers in bud .15—25 in. long, straight, terete, in slender racemes 1—3 in. long; leaves elliptic ovate or orbicular, obtuse, narrowed at base, up to 4 in. long, 2.5 in. broad, petiole .2—4 in. long.3. *Wallichianus*.

Flowers in bud .5—75 in. long, straight or curved, angular, in rather stout often solitary racemes up to 4 in. long; leaves broadly ovate or elliptic, obtuse, usually rounded cordate or sometimes auricled at base, up to 6 in. or more long, 3.5 in. broad, petiole stout, .5—7 in. long.4. *intermedius*.

Branchlets and inflorescence, sometimes the leaves more or less, furfuraceous pubescent; flowers in bud .5—1 in. long, curved, angular, in racemes 2—4 in. long; leaves ovate, obtuse or obtusely acute, acute or rounded or auricled at base, up to 5 in. long, 2.5 in. broad, petiole to 1 in. long.5. *obtusatus*.

Corolla gamopetalous:—

Corolla-lobes 4; flowers in bud narrow, clavate at tip and acute, densely covered with mealy golden tomentum, in axillary fascicles or short cymes, the tube .5—1 in. long, split down one side:—

Leaves ovate, orbicular or elliptic, obtuse, rounded at base, nearly glabrous above, more or less rusty tomentose beneath, up to 3 in. long, 1.5 in. broad; petiole short, sometimes 0.6. *buddleioides*.

Leaves ovate, covered, more or less, on both surfaces, with white or tawny flocculent tomentum:—

Leaves coriaceous, obtuse or slightly acute at apex, cordate at base, up to 4 in. long, 2.5 in. broad, petiole .75 in. long.7. *cordifolius*.

Leaves subcoriaceous, bluntly acute or obtuse at apex, narrowed or rounded at base, up to 3.5 in. long, 2.5 in. broad, petiole .5—1 in. long

8. *pulverulentus*.

Corolla-lobes 5:—

Corolla densely tomentose:—

Bracts large, up to .5 in. long; calyx-teeth distant; corolla-tube .75—1 in. long, curved, somewhat inflated at the middle, grey-tomentose without; leaves alternate, orbicular or obovate, obtuse, up to 1 in. in diam., sometimes much less, softly white grey or tawny tomentose.9. *bracteatus*.

Bracts small, ovate:—

Calyx-teeth short, triangular, regular; corolla-tube curved, split half-way, inflated below, .4—6 in. long, densely rusty-floccose-woolly; leaves alternate, obovate, obtuse, cuneate at base, black above when dry, densely rusty-floccose below, up to 2.5 in. long, 1 in. broad, nerves 3 pairs, prominent.10. *tomentosus*.

Calyx-teeth long and irregularly lobed; corolla-tube curved, split half-way, gibbously inflated below the middle, .5—75 in. long, rusty-villous; leaves obovate, obtuse, cuneate at base, blackish green above when dry, thinly grey- or tawny-pubescent beneath or glabrous, up to 3 in. long, 1.5 in. broad, 3-nerved at base; berry oblong.11. *recurvus*.

Corolla at first stellate-pubescent, afterwards nearly or quite glabrous:—

Bract boat-shaped, longer than the calyx; calyx very white-lanate, shortly and evenly toothed; corolla-tube slender, inflated at the middle, .75 in. long; leaves obovate, obtuse, cuneate at base, grey-lanate, up to 1 in. long, .4 in. broad.....12. *courtallensis*.

Bract ovate, shorter than the calyx; calyx-lobes irregular and again toothed; corolla-tube slender, straight or very slightly inflated above, finally glabrous without, .75—1.25 in. long; leaves obovate, obtuse or retuse, cuneate at base, 3-nerved, up to 1.5 in. long, .75 in. broad, glabrous and black when dry.....13. *cuneatus*.

Corolla glabrous without, with very rare exceptions:—

Flowers in racemes:—

Branchlets terete:—

Racemes 1—4 in. long, solitary or fascicled, usually upcurved with upcurved flowers varying in length from 1—2.5 in.; bract concave; calyx entire, truncate; leaves thickly coriaceous, opposite or alternate, varying from elliptic or oblong to orbicular cordate or to linear, and up to 7 in. long, 4 in. broad; berry ovoid-oblong.....14. *longiflorus*.

Racemes about 1 in. long, many-flowered, the flowers 1—1.5 in. long; bract short, cup-shaped; calyx cupular, obtusely unequally 5-lobed; leaves very coriaceous, large, opposite or alternate, obtuse, elliptic-oblong or orbicular, up to 4 in. long, 2 in. broad.....15. *sarcophyllus*.

Branchlets trigonous; racemes 1—1.5 in. long, the flowers .5—75 in. long; bract cup-shaped, very oblique; calyx cupular, spreading, truncate; leaves very coriaceous, large, broadly elliptic ovate or orbicular, obtuse or acute, up to 6 in. in diam.....16. *trigonus*.

Flowers in axillary fascicles or cymes:—

Flowers sessile, fascicled at the nodes of the branches; corolla 1 in. long, the lobes spirally twisted; bract very small; calyx-limb cupular, entire; leaves very coriaceous, opposite, sessile, ovate elliptic or orbicular, obtuse, acute at base, up to 4.5 in. long, 2 in. broad, 3—5-ribbed; berry globose.....17. *elasticus*.

Flowers solitary or in very short peduncled cymes, chiefly in the axils of fallen leaves; corolla 1 in. long, cleft to the middle, one or two divisions to the base, lobes recurved; bract small; calyx obscurely toothed; leaves very coriaceous, opposite, variable, usually elliptic-oblong -lanceolate or -obovate, obtuse, narrowed at base, up to 6 in. long, 4 in. broad, nerves few and irregular; berry obovoid.....18. *neelgherrensis*.

Flowers in axillary or lateral peduncled umbellate cymes, corolla 1—1.5 in. long, very straight, erect; bracts cup-like but one-sided; calyx-lobes triangular; leaves coriaceous, opposite or alternate, oblong-lanceolate, acute, cuneate at base, up to 3 in. long, 1.25 in. broad, the nerves obscure; berry oblong.....19. *memecylifolius*.

Flowers in groups of about 5, the bracts forming a large bell-shaped involucre, the groups 2—3 together in the axils of the leaves or of the scars of fallen leaves; calyx-tube tomentose, limb shortly 5-toothed; corolla slender, 1.5—2 in. long, constricted slightly below the limb; leaves thinly coriaceous, opposite or alternate, orbicular or oblong, rounded at base, up to 5 in. long, 3 in. broad.....20. *lageniferus*.

1. LORANTHUS HOOKERIANUS, W. & A. 381; F. B. I. v. 207.

W. Gháts, Nilgiris, Anamalai Hills and hills of Tinnevely, up to 4,000 ft.

A rather slender parasitic shrub, the branches speckled with minute tubercles. Has been found on *Mallotus philippinensis* (Fischer).

2. LORANTHUS WIGHTII, Hook. f.; F. B. I. v. 207.

W. Gháts, Courtallum and Chokampatti hills of Tinnevely, about 3,500 ft. (Wight, Beddome).

A slender parasitic shrub with speckled nodose branchlets.

3. *LORANTHUS WALLICHIANUS*, Schultes; F. B. I. v. 205; W. & A. 381; Wt. Ic. t. 143.
W. Gháts, in all Districts from S. Canara southwards, up to about 4,000 ft.
A rather stout parasitic shrub with pale brown terete branchlets and pale red flowers. Found by Fischer on *Helicteres* and *Memecylon*.
4. *LORANTHUS INTERMEDIUS*, Wight; Hook. f. in F. B. I. v. 205.
W. Gháts, Nilgiris, Pulneys and hills of Travancore, at 3,000—6,000 ft.
A stout parasitic shrub, the flowers red, common in Nilgiri Sholas and often on *Cinnamomum Wightii* (Barber) and *Machilus macrantha* (Fischer).
5. *LORANTHUS OBTUSATUS*, Wall.; F. B. I. v. 205; W. & A. 381; Bidie Report on Neelgh, Loranth. t. iii.
W. Gháts, in most Districts, especially at high levels in Nilgiris, Pulneys, etc., at above 5,000 ft.
A large parasitic shrub with red and orange flowers, often found on *Rhododendron*, *Symplocos*, *Daphniphyllum* and many other Shola trees, also on *Acacia Melanoxylon* in the plantations.
6. *LORANTHUS BUDDLEIODES*, Desv.; W. & A. 382. *L. Scurrula*, Roxb. Cor. Pl. t. 140; F. B. I. v. 208, *not* of Linn.
N. Circars, Mahendragiri Hill in Ganjam, 4,500 ft. (Fischer and Gage), Rampa Hills (V. Narayanswami); Deccan, hills of Mysore, Bellary and Coimbatore; W. Gháts, chiefly on W. and E. slopes, up to 6,000 ft.
A parasitic shrub found growing on various different kinds of tree; flowers greenish-yellow.
7. *LORANTHUS CORDIFOLIUS*, Wall.; F. B. I. v. 209.
Deccan, in hilly country, Chittoor to Coimbatore, 2,000—3,000 ft.; W. Gháts, Nilgiris, at 2,000—5,000 ft.
A large parasitic shrub, conspicuous from the thick fascicles of orange-tawny flowers and white or pale brown young leaves and shoots.
8. *LORANTHUS PULVERULENTUS*, Wall.; F. B. I. v. 211.
N. Circars, forests of the E. Gháts, Ganjam to Rampa, at 1,000—2,500 ft. (Gamble, Barber).
A stout parasitic shrub, found on deciduous trees chiefly.
9. *LORANTHUS BRACTEATUS*, Heyne; F. B. I. v. 213. *L. tomentosus*, W. & A. 385; Wt. Ic. t. 378.
N. Circars, Deccan and Carnatic, in forests of Vizagapatam, Nellore, S. Arcot, Cuddapah and Kurnool, up to 2,000 ft. westwards to the E. slopes of W. Gháts.
A small parasitic shrub, the flowers in cymes or umbels of 3—5, greenish, striped, on various species of deciduous tree.
10. *LORANTHUS TOMENTOSUS*, Heyne; F. B. I. v. 212; Bidie t. viii.
Deccan, hills of Mysore and N. Coimbatore, 3,000—5,000 ft.; W. Gháts in S. Canara (Hohenacker), Coorg, Wynaad, at 3,000—4,000 ft. (Gamble), and southwards.

A small parasitic shrub, the branchlets nearly black; found in Coorg on *Neolitsea zeylanica*, also by Fischer on various other kinds of tree.

11. *LORANTHUS RECURVUS*, Wall.; F. B. I. v. 213; W. & A. 383. *L. Candolleanus*, W. & A. 385; Wt. Ic. t. 305.
W. Ghâts, Nilgiri Hills, in Shola woods above 6,000 ft.
A parasitic shrub with smooth grey bark, ovoid-oblong fruits, yellow flowers and characteristic calyx, reported as growing in the Nilgiri Sholas and plantations on *Acacia Melanoxylon*, *Viburnum*, *Glochidion*, etc.
12. *LORANTHUS COURTALENSIS*, Gamble, *n. comb.* *L. bracteatus*, Heyne, var. *angustifolia*, Hook. f.; F. B. I. v. 213.
W. Ghâts, Pulney Hills and hills of Tinnevely about Courtallum, (Wight, Barber).
A slender twiggy parasitic shrub.
13. *LORANTHUS CUNFATUS*, Heyne; F. B. I. v. 214; W. & A. 385; Bidie t. ix.
N. Circars and Deccan, in hilly country; W. Ghâts, in most Districts, at various levels, common.
A bushy shrub with grey bark and prominent nodes, parasitic on a great variety of trees and shrubs, indigenous and introduced (like *Acacia Melanoxylon*). The corolla is greenish-yellow outside, orange within, the stigma red, also the fruits.
14. *LORANTHUS LONGIFLORUS*, Desv.; F. B. I. v. 214; W. & A. 384; Wt. Ic. t. 302. *L. bicolor*, Roxb. Cor. Pl. t. 139.
All plains Districts, chiefly in deciduous forests, common. A large parasitic shrub with handsome and conspicuous racemes of scarlet orange or pink flowers succeeded by pink berries. It is found on a great number of different hosts.
Var. *falcatus*, Kurz. Leaves linear or falcate, up to 6 in. long, the flowers rather short.
Plains Districts, chiefly in the dry country, frequently on *Acacia* and its neighbours.
Var. *amplexifolius*, Tbw. Leaves large, orbicular or shortly oblong, obtuse cordate and amplexicaul at base, the flowers often long and the racemes frequently terminal. *L. amplexifolius*, DC.; Bidie t. vii.
W. Ghâts, chiefly in hilly regions up to 6,000 ft., in most Districts.
Var. *pubescens*, Hook. f. Leaves rather small, oblong, racemes with the flowers minutely pubescent.
W. Coast and lower hills of W. Ghâts.
15. *LORANTHUS SARCOPHYLLUS*, Wall.; W. & A. 384; F. B. I. v. 217.
W. Ghâts, Nilgiris and hills of Madura (Wight).
A very stout parasitic shrub, much resembling *L. longiflorus* but recognized by the calyx-lobes. Said to grow on *Ficus*.
16. *LORANTHUS TRIGONUS*, W. & A. 386; F. B. I. v. 219.
W. Ghâts and W. Coast from S. Canara southwards, Coorg, Nilgiris and Pulneys up to 3,000 ft.; Bababudan Hills of Mysore, at 3,500 ft. (Meebold).
A large very thick and fleshy parasitic shrub with warted

branches and trigonous branchlets, found on the Banyan fig (*Gamble*) and other trees.

17. *LORANTHUS ELASTICUS*, Desv.; F. B. I. v. 216; W. & A. 386; Wt. Ic. t. 343. *L. Euphorbiae*, Wt. Ic. t. 1063.

Deccan, in Mysore; Carnatic, Kambakam Hill in Chingleput, 2,000 ft., Melpat in S. Arcot, Kollimalai Hills of Trichinopoly; W. Coast, S. Canara to Travancore also at low levels in W. Ghâts.

A dichotomously branching parasitic shrub with striped green and white flowers, red stamens and a pink berry. It is not uncommon on the mango, orange, nutmeg, *Samadera*, *Thespesia*, and other trees of hot low-level country. The smaller-leaved *L. Euphorbiae* is found on the tree *Euphorbias*, *E. tortilis* and *E. antiquorum*, in Coimbatore, and is perhaps distinct.

18. *LORANTHUS NEELCHERRENSIS*, W. & A. 382; F. B. I. v. 216; Wt. Ic. t. 1020; Bidie tt. iv. v. x.

W. Ghâts, Nilgiris, Anamalais and Pulneys, at high levels above 4,000 ft.

A large woody parasitic shrub with crimson-scarlet flowers, orange inside the tube, the berry red, also the young leaves. It is common on many shola trees and also very frequent on the introduced Australian *Acacias*.

Var. *Clarkei*, Hook. f. Flowers small with short corolla-lobes. Nilgiri Hills at 7,000 ft. (C. B. Clarke).

19. *LORANTHUS MEMECYLIFOLIUS*, W. & A. 383; F. B. I. v. 217.

W. Ghâts, Nilgiri Hills, above 5,000 ft.

A stout glabrous parasitic shrub with scarlet corolla. It occurs on various shola trees, *Rhododendron*, *Rapanea*, *Daphniphyllum*, etc.

20. *LORANTHUS LAGENIFERUS*, Wt. Ic. t. 306; F. B. I. v. 218.

W. Coast, S. Canara, Mysore and Malabar, apparently in deciduous forests (Wight, Rangachari).

A large parasitic shrub, the involucre reddish, the corolla green or green and red. Dr. Cooke gives it as found on *Holarrhena* and *Adina*.

2. *Elytranthe*, Blume (amplified).

Parasitic shrubs. *Leaves* opposite or subopposite, more or less coriaceous, entire. *Flowers* few, in spikes racemes or pairs with 1 bract and 2 bracteoles which may be free or combined in a cup. *Calyx*-tube cylindric, the limb small, truncate. *Corolla*-tube usually entire, more or less cylindric or funnel-shaped; lobes 5 or 6, usually 6, equal, reflexed in flower. *Stamens* 5—6, anthers basifixed, often septate. *Ovary* enclosed in the calyx-tube; style slender; stigma usually capitate. *Fruit* and *seed* as in *Loranthus*.

Corolla 1—2 in. long, cleft to nearly half-way down, usually curved; leaves ovate-oblong or lanceolate, up to 5 in long, 2 in. broad.....1. *loniceroides*.
Corolla under 1 in. long, cleft to below the middle, hardly curved; leaves elliptic-lanceolate, up to 4 in. long, 1.5 in. broad.....2. *capitellata*.

In both species the bract and bracteoles are orbicular, the latter combined in a cup, the anthers septate, very slender.

1. ELYTRANTHE LONICEROIDES, Engler. *Loranthus loniceroides*, Linn.; F. B. I. v. 221; Wt. Ic. t. 203; Bidie t. vi. *except anthers and ovary*. W. Ghâts, in Mysore, Nilgiris, Anamalais and Pulneys, chiefly at levels above 5,000 ft.; a form in Coimbatore below 3,000 ft. has smaller leaves.
A large parasitic shrub with variegated corolla, the tube scarlet or pink below changing to yellow, the lobes green. The berry is green tipped with the cylindric calyx-limb. The large-leaved hill form is abundant on Australian Acacias, but also occurs on various Shola trees; the small-leaved one is chiefly found on *Terminalia*, *Anogeissus* and various species of fig.
2. ELYTRANTHE CAPITELLATA, Engler. *Loranthus capitellatus*, W. & A. 382; F. B. I. v. 221.
Deccan and Carnatic, in hilly country, westwards to the lower hills of the W. Ghâts, up to about 3,000 ft.
A parasitic shrub with variegated corolla, the tube white changing to red and above to green, with purple lines. It is found on various plains trees like the mango, figs, etc.

3. Korthalsella, van Tiegh.

Leafless parasitic small shrubs, the branches jointed, furnished with bracteate scales at the joints, the joints all in the same plane. *Flowers* in the axils of the scales, monoecious, surrounded by tufts of hair, ♂ and ♀ with 3 perianth-lobes which are persistent after flowering in ♀. *Anthers* 3, 2-celled, the cells opening introrsely by longitudinal slits, but the anthers being connected at their margins, the pollen issues from a central aperture. *Ovary* obovoid; placenta central; stigma small. *Fruit* an obovoid fleshy berry with viscid mesocarp, embryo basal. *Seed* albuminous.

KORTHALSELLA JAPONICA, Engler. *Viscum japonicum*, Thunb.; F. B. I. v. 226. *V. moniliforme*, W. & A. 380; Wt. Ic. t. 1018, and Spic. Neelg. t. 87

W. Ghâts, Nilgiri, Anamalai and Pulney Hills, above 5,000 ft.

A small densely tufted parasitic undershrub with obovate keeled flattened joints and minute flowers. It is found on Shola trees, especially on *Rhododendron*, *Vaccinium*, *Eurya* and *Ilex*.

Var. *coralloides*: *Viscum moniliforme*, W. & A., var. *coralloides*, Wt. Ic. t. 1019, is really only a smaller form with narrower joints.

4. Viscum, Linn.

Parasitic shrubs, growing on trees; branches usually 2–3-chotomous, jointed, the internodes terete, angular or flattened. *Leaves* opposite, flat and thick or reduced to small scales. *Flowers* usually monoecious, small, fascicled or solitary or more often in triads, in the axils of the leaves or at the nodes of the branches, rarely terminal; bracts small; bracteoles 2, free or connate in a cup. *Perianth*-tube in ♂ solid, in ♀ adnate to the ovary; lobes usually 4, sometimes 3, short, ovate or triangular. *Stamens* as many as the perianth-lobes and adnate to them, dehiscing introrsely by numerous pores. *Ovary* inferior,

1-celled; ovules solitary or paired; stigma sessile or subsessile. *Fruit* a succulent berry with soft viscid mesocarp. *Seed* adnate to the pericarp; albumen copious, solid; embryo terete enclosed in the albumen, solitary or 2 to each seed.

Leafy shrubs:—

Leaves always present and persistent:—

Leaves acuminate at apex, obliquely ovate or lanceolate, often falcately curved, narrowed at base, 3–5-ribbed, 1.5–4 in. long, .5–1 in. broad; bracteoles apiculate; lateral flowers of triads usually ♀, central ♂ or wanting; berry oblong.....1. *monoicum*.

Leaves obtuse at apex; bracteoles not apiculate:—

Berry globose, very minutely papillose; leaves obovate elliptic or oblong, petioled, obtuse or slightly acute, attenuate at base, 3- rarely 5-ribbed, 1–2 in. long, .4–1.5 in. broad; lateral flowers of triads usually ♂, central sometimes all ♀.....2. *orientale*.

Berry oblong:—

Berry smooth; leaves elliptic, waved at the margin, obtuse or very slightly acute, shortly petioled, 1–2 in. long, .4–1 in. broad; 3–5-ribbed; flower-triads clustered, the flowers all or lateral ♀, inner ♂, the ♀ elongate, the ♂ often with 3 perianth-lobes only.....3. *orbiculatum*.

Berry, especially when young, covered with little warts; leaves obovate or oblong, obtuse or slightly acute, attenuate at base to a short petiole, .5–1.5 in. long, .4–.7 in. broad, 3- rarely 5-ribbed; flowers fascicled, in peduncled triads, the lateral usually ♂.....4. *verruculosum*.

Leaves apparently deciduous, sometimes wanting altogether:—

Leaves usually present, broadly orbicular-obovate, emarginate and usually mucronate at apex, cuneate and decurrent at base, about 1–1.25 in. in diam., obscurely 3- or pedately 5-ribbed; middle flower of triad usually ♂; berry ovoid, rough, white or pale green.....5. *capitellatum*.

Leaves usually absent, when present only on lower branches, obovate, about 1 in. long, 3-ribbed; outer flowers of triads usually ♂; berry very small, subglobose.....6. *ramosissimum*.

Leaves few and sparse, yellow when dry like the angular branchlets, oblanceolate, up to 1.5 in. long, about .3 in. broad, 3-ribbed; outer flowers of triads ♂.....7. *mysorenses*.

Leafless shrubs:—

Internodes of the branchlets tetragonous, uniform; flowers minute, in triads, sessile, solitary or whorled at the nodes, the ♂ flowers usually lateral, the ♀ central; berry minute, globose, .1 in. in diam.....8. *angulatum*. Internodes of the branchlets flattened, broadening gradually from the base to the top; each at right angles to its neighbours, but twisted near the base, so that all seem to be in one plane; flowers in axillary fascicles of 1–3, the central flower of a triad usually ♀; berry globose, up to .15 in. in diam., glassy white.....9. *articulatum*.

1. *VISCUM MONOICUM*, Roxb.; F. B. I. v. 224; W. & A. 379 (under *V. orientale*).

N. Circars, hills of Ganjam and Vizagapatam, up to 3,500 ft. (Barber, A. W. Lushington); W. Ghâts, Pülney Hills in Poombarai valley (Bourne), Nilgiris (G. Thomson).

A parasitic shrub with rather thin leaves and usually yellowish berry.

2. *VISCUM ORIENTALE*, Willd.; F. B. I. v. 224; W. & A. 379.

N. Circars and Carnatic, especially Coast Districts, but also westwards to lower hills of W. Ghâts in Coimbatore.

A rather large shrub, parasitic on many kinds of tree, *Albizzia*, *Pongamia*, *Wrightia*, etc., berry purple.

3. *VISCUM ORBICULATUM*, Wt. Ic. t. 1016; Spic. Neilg. t. 86; F. B. I. v. 224.
W. Ghâts, Nilgiri Hills, above 5,000 ft.
A small bushy shrub with angular grooved branches, found by Wight on *Vaccinium Leschenaultii*.
4. *VISCUM VERRUCULOSUM*, W. & A. 379; F. B. I. v. 224.
Deccan, hills of N. Coimbatore; W. Ghâts, Nilgiris, Anamalais and hills of Tinnevely and Travancore, up to 6,000 ft.
A parasitic shrub with usually terete branches.
5. *VISCUM CAPITELLATUM*, Sm.; F. B. I. v. 225; W. & A. 380.
Carnatic, Coast of S. Arcot (Lawson); Deccan, N. Coimbatore Hills (Fischer); W. Ghâts, S. E. Wynaad at 3,000 ft. (Gamble).
A small parasitic shrub with stout usually terete branches, found in two forms, the leafy one (α of W. & A.) with obtuse broad obovate leaves, perhaps *V. trilobatum*, Talbot, the other with few obovate spatulate leaves (β of W. & A.) and usually more floriferous. It has been found on various trees, *Rhizophora*, *Salvadora*, etc., also on *Loranthus longiflorus*, especially var. *jalcatius*.
6. *VISCUM RAMOSISSIMUM*, Wall.; W. & A. 380; F. B. I. v. 225.
Deccan, in Mysore and Coimbatore; W. Ghâts, Nilgiris to hills of Tinnevely up to 6,000 ft.
A many and slenderly branched parasitic shrub, almost broom-like, with terete branches and branchlets. It is found on various trees, *Acacia*, *Rhus*, *Santalum*, *Ficus*, also on *Loranthi*.
7. *VISCUM MYSORENSE*, Gamble in Kew Bull. 1925, 329.
Deccan, Arsikere in Mysore, about 2,000 ft. (Meebold).
A parasitic shrub, yellow when dry, the internodes of the branchlets angular or flattened.
8. *VISCUM ANGULATUM*, Heyne ex DC.; F. B. I. v. 225. *V. ramosissimum*, Wt. Ic. t. 1017, except ♂ flowers.
W. Ghâts, in most Districts on the lower hills up to 4,000 ft., chiefly on N. and E. sides; forests of N. Coimbatore.
A leafless slender parasitic shrub, found on various species of chiefly deciduous trees.
9. *VISCUM ARTICULATUM*, Burm.; F. B. I. v. 226. *V. attenuatum*, DC.; W. & A. 380.
N. Circars and Carnatic from the Godavari southwards, westwards to the lower hills of W. Ghâts.
A slenderly-branched parasitic shrub, the internodes scarcely 3 in. in maximum diameter, longitudinally striate. The ♂ flowers are very small and scarce, the ♀ very often solitary, the berry 1 in. in diam. Found on many species, chiefly of deciduous trees.
Var. *dichotomum*, Kurz. Much stouter and more common, but not easily separated in some cases, the internodes up to 5 in. broad and very prominently striate; flowers larger and usually in triads; berry about 15 in. in diameter.
N. Circars, Deccan and Carnatic in most Districts, on many species of tree.

Family CXXXII. SANTALACEAE.

Trees, shrubs or herbs, many being parasitic or semiparasitic on the branches or roots of other plants. *Leaves* alternate or opposite, entire, sometimes scale-like or 0; stipules 0. *Flowers* hermaphrodite or unisexual, regular, small, solitary or in simple or compound cymes; bracts usually small; bracteoles 2, sometimes 1 or both obsolete. *Perianth* superior or partly inferior, 3–8-lobed or -toothed, the lobes often with a tuft of hairs behind the anthers. *Stamens* as many as and opposite to the perianth-lobes, attached to or above the perianth-base; anthers 2-celled. *Disk* epigynous or perigynous. *Ovary* 1-celled, inferior; ovules 2–3, adnate to or pendulous from a central column; style short; stigma entire or 3–6-lobed. *Fruit* a nut or drupe. *Seed* globose or ovoid, smooth rugose or sulcate; testa thin or wanting; albumen copious, fleshy; embryo usually terete; radicle superior.

Herbs; perianth semi-superior, the tube adnate to the base of the ovary and usually produced above it; fruit a small nut.....1. *Thesium*.
Trees or shrubs; perianth superior, the tube adnate to the ovary, not produced above it; fruit a drupe:—

Not spinous; anther-cells distinct, parallel; drupes small:—

Leaves opposite; stamens with interposed processes; flowers hermaphrodite, the perianth-lobes usually 4.....2. *Santalum*.
Leaves alternate; stamens without interposed processes; flowers polygamous, the perianth-lobes usually 3.....3. *Osyris*.

Often spinous; anther-cells divergent or confluent; leaves alternate, drupe large
4. *Scleropyrum*.

1. *Thesium*, Linn.

Slender perennial herbs, usually parasitic on roots. *Leaves* alternate, narrow, decurrent. *Flowers* minute, greenish, solitary and axillary or in 2-chotomous cymes, hermaphrodite. *Perianth* adnate to the ovary, the tube produced above it; lobes 5, rarely 4. *Stamens* 5 or 4, inserted at the base of the perianth-lobes, included. *Ovary* inferior; ovules 2–3, pendulous from a basal often flexuous column; style cylindric or very short; stigma capitate or lobed. *Fruit* a dry nut, often ribbed. *Seed* conform to the nut; embryo terete, straight or oblique; cotyledons small; radicle as long as or longer than the cotyledons.

THESIUM WIGHTIANUM, Wall.; F. B. I. v. 230; Wt. Ic. t. 1852, *except the anthers*.

W. Gháts, Nilgiris and Pulneys and Atapadi Hills of Malabar, above 6,000 ft., on the downs among grass.

A slender plant with many straggling branches often procumbent at the base, narrow linear leaves, small solitary flowers, and a small hard globose nut.

2. *Santalum*, Linn.

Trees or shrubs usually semiparasitic on the roots of other kinds; branches usually slender, glabrous. *Leaves* opposite or rarely alternate, glabrous. *Flowers* hermaphrodite, axillary or in terminal 3-chotomous paniculate cymes; bracts minute. *Perianth*-tube campanulate or ovoid, adnate to the base of the ovary; lobes 4, rarely 5, valvate, with a tuft

of hairs on the face. *Stamens* 4 or 5, adnate to the bases of the perianth-lobes, alternating with the fleshy scales of the disks; filaments short; anthers ovate, the cells distinct, parallel. *Disk* of the scales between the stamens. *Ovary* at first free, later semi-inferior; ovules 2—3, pendulous from below the top of a long acuminate central column; style elongate; stigma 2—3-lobed. *Fruit* a subglobose drupe, annulate on the top by the deciduous perianth, endocarp rugose. *Seed* subglobose; albumen copious; embryo terete, slender; radicle longer than the cotyledons.

SANTALUM ALBUM, Linn.; F. B. I. v. 231; Bedd. Fl. t. 256. *Sirium myrtifolium*, Roxb. Cor. Pl. t. 2.

N. Circars, in Vizagapatam, scarce; Carnatic, hills of S. Arcot, Salem and southwards; Deccan, in all Districts but especially in Mysore, Coimbatore and plains N. of Nilgiris, up to 3,000 ft.; W. Ghâts, on E. slopes in Mysore, Coorg and Nilgiris; in dry open scrub forests and hedgerows. Sandal. A small evergreen usually semiparasitic glabrous tree with elliptic-ovate leaves up to 3 in. long, 1.5 in. broad, glaucous beneath, the flowers brownish-purple, the drupe black when ripe. Bark dark grey, rough; wood hard and close-grained, sapwood white, scentless, heartwood yellowish-brown, strongly scented and in great demand for carvings, the distillation of oil, export to China, etc., and in burial ceremonies. For an account of the parasitism and growth of the tree, the "spike" disease, etc., see Troup, Silv. Ind. Trees iii. 749. Vern. *Hind.* Chandan; *Tam.* Srigandam; *Tel.* Chandanum.

3. *Osyris*, Linn.

Shrubs with angular branchlets. *Leaves* alternate, entire; stipules 0. *Flowers* small, axillary, polygamous (♂ and ♀), the ♂ flowers in clusters, the ♀ often solitary. *Perianth-tube* solid in the ♂ flowers, adnate to the ovary in the ♀; lobes 3—4, triangular, valvate, with a tuft of hair on the face. *Stamens* 3 or 4, inserted at the base of the perianth-lobes; anther-cells distinct. *Disk* angular, between the stamens. *Ovary* inferior, sunk in the perianth-tube; ovules 2—4, pendulous from a short central placenta; style short; stigma 3—4-lobed. *Fruit* a globose or ovoid drupe. *Seed* globose, solitary; embryo small, in the centre of copious fleshy albumen.

OSYRIS ARBOREA, Wall.; F. B. I. v. 232. *O. Wightiana*, Wall.; Wt. Ic. t. 1853.

N. Circars, Mahendragiri Hill in Ganjam, at 4,500 ft. (Gamble); Deccan, in hills in Mysore, on Horsleykonda, Chittoor, 4,000 ft.; Carnatic, Shevaroy Hills of Salem; W. Ghâts, in most Districts, above 3,000 ft.

An evergreen shrub with coriaceous elliptic-lanceolate even orbicular leaves mucronate at apex, very small flowers and small hard yellow drupe. Bark greyish-brown, rough; wood red, close-grained. Vern. *Mar.* Popli.

4. *Scleropyrum*, Arnott.

Trees with axillary spines. Leaves alternate, coriaceous. Flowers polygamous, in short catkin-like spikes at the leafless nodes of the branchlets. Perianth-tube of ♂ flowers solid, of ♀ or ♂ flowers adnate to the ovary; lobes 4–5, valvate or sub-imbricate, with a tuft of hair behind the stamens. Stamens 4–5, inserted at the base of the lobes; filaments bifid, the anther-cells on separate branches, dehiscing transversely. Disk annular, undulate. Ovary inferior; ovules 3, pendulous from the top of a central column; style short; stigma large, peltate. Fruit a pyriform drupe on a thickened pedicel, crowned by the remains of the perianth-lobes; exocarp thick, fleshy, endocarp hard. Seed 1, globose; albumen copious; embryo terete, central; cotyledons oblong.

SCLEROPYRUM WALLICHIANUM, Arn.; F. B. I. v. 234; Wt. Ic. t. 241.

Pyralia Wallichiana, A. DC.; Bedd. Fl. t. 304.

W. Ghâts, S. Canara to Travancore, in evergreen forests, up to 3,000 ft.; Coorg and Wynaad, 3,000–5,000 ft.

A small tree with thick, sharp, conical spines, small reddish flowers and large red drupe, the leaves ovate-oblong, up to 7 in. long, 3 in. broad, 3–5-ribbed at base.

Family CXXXIII. BALANOPHORACEAE.

Glabrous, fleshy root-parasites, without leaves, stomata or chlorophyll, the rhizomes hard and warted, through the rind of which the flowering stems burst irregularly and are usually stout and scaly. Flowers monoecious or dioecious, crowded in large globose or elongate stoutly-peduncled heads, the ♂ and ♀ flowers very dissimilar; the ♂ of 3–8 valvate perianth-lobes, fairly large, sometimes 0; the ♀ without perianth and very minute or confluent with the ovary, often mixed with clavate bodies. Stamens as many as the perianth-lobes and opposite to them or the filaments connate in a column or tube; anthers free or connate, 2–many-celled, opening by pores or valves or bursting irregularly. Ovary 1–3-celled, ovule 1 in each cell usually pendulous; styles 1–2 or 0, stigmas simple or capitellate. Fruit minute, 1-seeded. Seed usually adherent to the pericarp, testa thin or 0, albumen granular and oily; embryo very minute.

Balanophora, Forst.

Glabrous fleshy herbs with a tuberous rootstock warted with lenticels abounding in a waxy secretion. Peduncles bursting through the rootstock, which forms a ring or sheath at their base. Flowers: ♂ with a perianth of 2–6 valvate lobes, stamens 2–∞, the filaments 0 or connate in a column, the anthers (in our species) horse-shoe-shaped; ♀ without perianth, ovary ellipsoid, 1-celled; style long, slender; stigma simple, many minute flowers surrounding a clavate body. Fruit minute, crustaceous. Seed globose; albumen oily; embryo of 2–3 cells only.

Heads in ♂ cylindric, in ♀ ovoid; perianth-lobes usually 4, oblong, acute, reflexed; staminal column elongate.....1. dioica.

Heads in ♂ obovoid or subglobose, in ♀ globose, often very large; perianth-lobes usually 4, short, obtuse, erect; staminal column short.....2. **indica.**

1. **BALANOPHORA DIOICA**, R. Br.; F. B. I. v. 237.

N. Circars, hills of Vizagapatam (Gamble).

As the ♂ flowers only are available, the identification is uncertain.

2. **BALANOPHORA INDICA**, Wall.; F. B. I. v. 237.

W. Ghâts, in the hills from Nilgiris to Travancore, up to 5,000 ft.

A thick rather common parasite, often very large, especially with the globose ♀ heads, reddish-brown or purple.

Family CXXXIV. BUXACEAE.

Trees or shrubs, rarely herbs. *Leaves* opposite or alternate, usually coriaceous and evergreen; stipules 0. *Flowers* unisexual, usually monoecious, in axillary or rarely terminal spikes or racemes, the ♂ and ♀ usually adjoining each other but the ♀ sometimes distinct; bracteate and bracteolate. *Perianth* calyciform, the lobes free and imbricate. *Stamens* as many as and usually opposite to the perianth-lobes; filaments erect, broad; anthers dorsifixed, the cells dehiscing longitudinally. *Ovary* 2—3-celled, rarely more, the cells 1—2-ovuled, the ovules with dorsal raphe; styles 2—3, short, usually recurved. *Fruit* a 2—3-celled capsule, or an indehiscent berry. *Seeds* 2—3 in each cell, often reduced to 1; testa crustaceous, smooth; albumen copious; cotyledons fleshy, flattened; radicle superior.

Leaves opposite; ♀ flowers in the spikes usually above the ♂; fruit capsular, dehiscent..... **Buxus.**
Leaves alternate; ♀ flowers in the spikes usually below the ♂, often separate and single; fruit a berry, indehiscent.....1. **Sarcococca.**

Sarcococca, Lindl.

Glabrous evergreen shrubs. *Leaves* alternate, entire, penni- or tripli-nerved. *Flowers* in short axillary racemes, monoecious, the ♀ below the ♂; bract 1; bracteoles few in ♂, more numerous and decussate in ♀. *Perianth-lobes* 4 in ♂, 4—6 in ♀ in opposite pairs. *Stamens* 4, opposite the perianth-lobes; filaments thick; anthers adnate to their tops, cells introrse. *Ovary* 2—3-celled; ovules 2 in each cell, the raphe dorsal; styles 2, recurved, the inner faces furrowed and papillose. *Fruit* an indehiscent coriaceous or fleshy berry, the endocarp hard. *Seeds* 1—2; testa membranous; albumen fleshy; cotyledons flat, cordate.

Leaves usually distinctly tripli-nerved, from about .5 in. above the base, lanceolate, long-acuminate at apex, acute at base, up to 6 in. long, 2.5 in. broad; racemes up to 1 in. long.....1. *trinervia.*
Leaves less distinctly tripli-nerved from nearer the base, ovate to ovate-elliptic, shortly and suddenly acuminate at apex, rounded and then acute at base, up to 3 in. long, 1.75 in. broad; racemes about .5 in. long.....2. *brevifolia.*

1. **SARCOCOCCA TRINERVIA**, Wt. Ic. t. 1877. *S. saligna* var. *densiflora*, Muell. Arg. *S. pruniformis*, Lindl.; F. B. I. v. 266 in part.

N. Circars, Mahendragiri Hill in Ganjam, 4,500 ft. (Gamble), Daringabadi (Barber), hills of Vizagapatam (A. W. Lushington):

W. Gháts, from Nilgiris southwards, usually at 4,000—7,000 ft., sometimes at low levels, S. Canara (Beddome), usually in forest undergrowth.

A large evergreen shrub. Bark light brown; wood white, close-grained, like boxwood, sometimes used for walking-sticks.

2. *SARCOCOCCA BREVIFOLIA*, Stapf in Herb. Kew. *S. saligna* var. *brevifolia*, Muell. Arg.

W. Gháts, Nilgiris, on Doddabetta 8,000 ft., in Shola undergrowth.

An evergreen shrub.

The Box, *Buxus sempervirens*, Linn., is commonly used for hedges on the Cinchona Estates in Nilgiris.

Family CXXXV. EUPHORBIACEAE.

Herbs, shrubs or trees, rarely climbers, often with milky juice. *Leaves* alternate or opposite, simple or rarely compound, usually stipulate, often glandular. *Flowers* usually small, often minute, monoecious or dioecious, the inflorescence variable. *Perianth* usually calycine, rarely petaloid, sometimes of both calyx and corolla, sometimes wanting in one or both sexes. *Calyx* inferior, valvate or imbricate, often different in the sexes. *Petals* when present free, sometimes scale-like, sometimes absent or different in the sexes. *Stamens* various, definite or indefinite; filaments free or connate; anthers 2-celled, the cells parallel or divaricate, dehiscing longitudinally or sometimes transversely. *Disk* various, usually annular, entire or lobed, or of free scales or 0. *Ovary* usually sessile, rarely stipitate, usually 3-celled; ovules in each cell 1 or 2, pendulous from the inner angle; style usually as many as the cells, free or more or less connate, erect or spreading, the inner faces usually stigmatic. *Fruit* usually capsular of 2-valved cocci separating from a persistent axis, sometimes indehiscent or drupaceous, 1—3-celled. *Seeds* attached laterally near to or above the middle of the cell with or without a caruncle or arillus; albumen usually copious fleshy; embryo straight, the radicle superior, the cotyledons broad and flat.

Cells of the ovary 2-ovuled except in 1:— (1—26)

Inflorescence of many pedicelled bracteolate stamens as ♂ flowers surrounding a single pedicelled ♀, the whole contained in a 4—5-lobed involucre:—

Involucre regular or nearly so.....1. *Euphorbia*.

Involucre obliquely zygomorphous.....*Pedilanthus*.

Flowers distinct, not contained in an involucre:—

Leaves simple, alternate:— (2—24)

Petals present, small:— (2—4)

Calyx valvate; filaments combined in a column:—

Fruit a drupe with 2 pyrenes; ovary 2-celled.....2. *Bridelia*.

Fruit a capsule; ovary 3-celled.....3. *Cleistanthus*.

Calyx imbricate; stamens free.....4. *Actephila*.

Petals wanting; calyx-lobes imbricate in bud:— (5—24)

Disk present, usually conspicuous and of glands:— (5—15)

Flowers, at any rate ♂, in clusters:— (5—14)

Fruit a dry capsule of 3 2-valved cocci:— (5—11)

Calyx-lobes 6 in both ♂ and ♀:— (5—7)

- Stamens 3, the filaments connate:—
 Stamens small, not apiculate; styles short, bifid, sunk in the top of the ovary.....5. *Agynceia*.
 Stamens elongate, apiculate; styles combined in a terminal column.....6. *Pseudoglochidion*.
 Stamens 6, the filaments free.....7. *Chorisandra*.
 Calyx-lobes 5 in both ♂ and ♀:—
 Stamens 5, the filaments connate.....8. *Neopeltandra*.
 Stamens 3, the filaments connate wholly, in part, or sometimes not at all.....9. *Phyllanthus*.
 Calyx-lobes 4 in ♂, 6 in ♀; stamens 2 or 4, the filaments connate.....10. *Reidia*.
 Calyx-lobes 4 in both ♂ and ♀; stamens 4, the filaments free.....11. *Prosorus*.
- Fruit a berry:— (12—13)
 Fruit small, fleshy, with 6—12 crustaceous seeds; ovules superposed; calyx-lobes 5.....12. *Kirganelia*.
 Fruit large, of 3—6 hard cocci in a fleshy epicarp:—
 Calyx-lobes 5—6; stamens 3, the filaments connate.....13. *Embllica*.
 Calyx-lobes 4; stamens 4, the filaments free.....14. *Cicca*.
 Fruit dry or fleshy with 6 cocci; stamens 5, the filaments free, alternating with the disk-glands and surrounding the pistillode.....14. *Fluggea*.
- Flowers in spikes or racemes, often panicled; ovary 1-celled.....15. *Antidesma*.
- Disk central, orbicular; stamens 4 to many:—
 Ovary 1-celled; drupe 1-seeded.....16. *Hemicyclia*.
 Ovary 2—4-celled; drupe 2—4-seeded.....17. *Cyclostemon*.
 Disk combined with the calyx-lobes, the 3 stamens in a column:—
 Anthers sessile on the angle of the column; calyx of both ♂ and ♀ spreading.....18. *Sauropus*.
 Anthers adnate to the column; calyx of ♂ turbinate, of ♀ spreading.....19. *Breynia*.
- Disk wanting:— (20—24)
 Stamens connate by their connectives in a column; styles also connate in a column; flowers in clusters.....20. *Glochidion*.
 Stamens free or rarely connate by their filaments:— (21—24)
 Flowers in spikes or racemes:—
 Fruit capsular:—
 Seeds without an aril; stamens 1—5; ♂ flowers in catkin-like spikes, ♀ in clusters.....21. *Aporosa*.
 Seeds with an aril; stamens 4—8; flowers in racemose spikes often in fascicles on the trunk.....22. *Baccaurea*.
 Fruit a drupe with woody endocarp; flowers in axillary racemes; stamens 5 or more.....23. *Daphniphyllum*.
 Flowers: ♂ in clusters, ♀ subsolitary; stamens 2—3 central.....24. *Putranjiva*.
- Leaves simple, whorled; calyx-lobes 5—6.....25. *Mischodon*.
 Leaves trifoliolate; calyx-lobes 5; flowers in panicles of racemes.....26. *Bischofia*.
- Cells of the ovary 1-ovuled:— (27—57)
 Filaments inflexed in bud; ♂ calyx imbricate valvate or nearly open; pistillode 0; indumentum scaly or stellate.....27. *Croton*.
 Filaments erect, rarely inflexed, but then pistillode conspicuous:— (28—56)
 Calyx in ♂ valvate:— (28—45)
 Petals present in ♂ flowers:— (28—30)
 Calyx 5-lobed, closed in bud then regularly valvate; herbs or undershrubs very stellate-hairy.....28. *Chrozophora*.
 Calyx irregularly valvate; trees or shrubs:—
 Not lepidote or stellate-pilose; pistillode prominent.....29. *Agrostistachys*.
 Lepidote or stellate-pilose; fruit drupaceous, indehiscent.....30. *Aleurites*.

- Petals in ♂ flowers 0:— (31–45)
 Partial inflorescence not involucre:— (31–44)
 Filaments free or shortly connate:— (31–44)
 Filaments not branched:— (31–41)
 Styles free or only slightly connate:— (31–40)
 Anthers not vermiculiform or linear:— (31–39)
 Anther-cells pendulous or adnate:— (31–37)
 Anthers 2-celled:— (31–35)
 Stamens numerous:—
 Fruit indehiscent; styles linear.....31. *Trewia*.
 Fruit a capsule; styles plumose.....32. *Mallotus*.
 Stamens 2–9:—
 Filaments inflexed.....33. *Symphyllia*.
 Filaments straight, dilated.....34. *Coelodepas*.
 Filaments slender.....35. *Alchornea*.
 Anthers 4-celled or 2-celled and 4-valved:—
 Connective produced; capsule large.....36. *Cleidion*.
 Connective not produced; capsule small.....37. *Macaranga*.
 Anther-cells discrete, ascending, divaricate
 Racemes uniformly floriferous; cocci dehiscing loculicidally
 38. *Claoxylon*.
 Racemes interrupted; cocci dehiscing loculand septically
 39. *Micrococca*.
 Anthers vermiculiform or linear; styles lacinate.....40. *Acalypha*.
 Styles connate; calyx of ♀ accrescent; stinging climbers
 41. *Tragia*.
 Filaments much branched; staminal bundles indefinite:—
 Leaves entire, penninerved:—
 Calyx-lobes of ♀ soon deciduous.....42. *Homonoia*.
 Calyx-lobes of ♀ enlarged after flowering.....43. *Lasiococca*.
 Leaves palmatifolobed.....44. *Ricinus*.
 Filaments connate in a column.....*Hevea*.
 Partial inflorescence involucre; climbers.....45. *Dalechampia*.
 Calyx in ♂ flowers:— (46–54)
 Petals present in ♂ flowers:— (46–52)
 Petals free:— (46–51)
 Stamens numerous:— (46–50)
 Flowers glomerate-spicate or racemose:— (46–48)
 Calyx not or scarcely enlarged in fruit:—
 Flowers in ♀ with petals.....46. *Ostodes*.
 Flowers in ♀ with no or very minute petals.....*Codiaeum*.
 Calyx enlarged under the fruit:—
 Flowers in ♀ with petals.....47. *Dimorphocalyx*.
 Flowers in ♀ apetalous.....48. *Blachia*.
 Flowers paniculate, the panicles branching dichasially:—
 Leaves palmatinerved.....49. *Jatropha*.
 Leaves penninerved.....50. *Tritaxis*.
 Stamens 3–8, usually 3.....51. *Trigonostemon*.
 Petals connate; leaves palmatinerved; fruit a drupe.....52. *Givotia*.
 Petals in ♂ flowers 0:—
 Leaves usually deeply lobed; ♂ calyx large, coloured.....*Manihot*.
 Leaves not lobed; ♂ calyx small, not coloured:—
 Disk of ♂ outside the stamens; leaves not punctate.....53. *Baliospermum*.
 Disk-glands large or only peripheric; leaves pellucid-punctate
 54. *Gelonium*.
 Calyx of ♂ open or slightly imbricate, usually much reduced; disk 0:—
 Calyx of ♂ 3-lobed; stamens 3 or 2:—
 Seeds carunculate; herbs.....55. *Sebastiania*.
 Seeds not carunculate; trees.....56. *Excoecaria*.
 Calyx of ♂ 2–3-lobed; stamens 2–3; seeds not carunculate.....57. *Sapium*.

1. *Euphorbia*, Linn.

Herbs, shrubs or small trees of various habit and with copious milky, usually acrid, juice. *Leaves* alternate or opposite, usually entire, often (in the fleshy species) caducous or much reduced; stipules various. *Flowers* monoecious, combined in an inflorescence of many ♂ *florets* surrounding a solitary ♀ and accompanied by many *bracteoles*, usually setaceous, but sometimes combined in a sheath, sometimes 0; the whole enclosed in a 4—5-lobed turbinate or campanulate *involucre*, having also between the lobes at their sinuses thick *glands*, which have sometimes horns and sometimes a petaloid spreading *limb*. *Perianth* 0 or of minute scales. *Stamen* in ♂ florets solitary, the filament jointed on a pedicel; anther 2-celled, erect, the cells usually subglobose, opening longitudinally. *Floret* of ♀ a 3-celled ovary on an often decurved pedicel; ovule solitary in each cell; styles 3, free or connate; stigmas simple or 2-fid. *Fruit* a capsule of 3 2-valved *cocci* separating elastically from a persistent axis, and dehiscing ventrally or both ventrally and dorsally. *Seeds* albuminous; testa more or less crustaceous, often with a caruncle; cotyledons flat; radicle superior.

Herbs, prostrate or ascending; leaves opposite; glands of involucre 4—5, usually with a petaloid limb:—

Erect and dichotomously branching; limb of gland more or less conspicuous, petaloid:—

Floral leaves distichous, imbricate, enclosing the involucre which are solitary or 2—3 only:—

Limb of gland entire or sinuate; leaves cordate, usually unequally, at base, minutely areolate-reticulate, serrulate:—

Limb of gland scarcely .05 in. long; plants nearly or quite glabrous; leaves elliptic-oblong, obtuse:—

Cocci obtusely keeled, hirsute or glabrous; seeds obtusely 4-angled, transversely furrowed or glabrous; limb white.....1. *pycnostegia*.

Cocci keeled and angled at base, nearly glabrous; seeds ovoid, papillose; limb pink.....2. *zornioides*.

Limb of gland .1 in. long, pink; plant with soft spreading hairs; leaves elliptic or orbicular, obtuse, the floral much imbricate; cocci rounded, hirsute; seeds 4-angled, transversely furrowed.....3. *elegans*.

Limb of gland pectinately lacinate; seeds transversely furrowed:—

Limb of gland glabrous or nearly so; leaves very small; cocci hirsute; seeds brown.....4. *fimbriata*.

Limb of gland with long hairs; leaves about .5—75 in. long, obliquely ovate-cordate, obtuse, serrulate; cocci rounded, hirsute; seeds white

5. *cristata*.

Floral leaves not distichous and imbricate:—

Limb of gland multifid almost to the base, the gland itself minute; leaves membranous, elliptic or oblong, obtuse, disantly serrulate, up to .75 in. long; cocci glabrous, keeled; seeds with 3—4 parallel furrows...6. *longistyla*.

Limb of gland entire, not multifid:—

Cocci with 2 dorsal wings; seeds obtusely 4-angled, papillose; involucre in small cymes, the limb of the gland rounded, white; leaves linear-oblong, mucronate, up to 1 in. long, .25 in. broad.....7. *notoptera*.

Cocci not winged:—

Involucres in subcorymbose terminal cymes; limb of gland broadly rounded, pink or white; leaves linear-oblong, coriaceous; obtusely acute, unequally cordate at base, up to 1 in. long, .2 in. broad; cocci glabrous, keeled.....8. *linearifolia*.

Involucres in terminal and axillary cymes:—

Dwarf glabrous seashore shrub with fleshy branches and leaves, the latter elliptic, obtuse, unequally rounded at base, up to 1 in. long,

- .5 in. broad; cymes corymbose, spreading, much bracteate; glands oblong, the limb very small or 0; cocci glabrous; seeds globose, smooth.....9. *Atoto*.
- Erect slender inland herbs; not fleshy; seeds with shallow furrows:—
 Cymes not capitate; plant nearly glabrous; leaves thin, glaucous, elliptic oblong or obovate, obtuse, serrulate, up to 1 in. long, .5 in. broad; limb of gland small, retuse, white or pink; cocci hispid; seeds reddish-glaucous.....10. *hypericifolia*.
- Cymes capitate, often in pairs; plants with hispid often yellowish hairs; leaves obliquely elliptic or lanceolate, acute, serrulate, up to 1.5 in. long, .5—.75 in. broad, pale beneath; limb of stalked gland minute or 0; cocci appressed pubescent; seeds reddish.....11. *hirta*.
- Erect herbs, also with many prostrate or spreading branches:—
 Limb of gland pink, the 2 upper large obliquely oblong, obtuse or notched, the 2 lower small; leaves green, obliquely obovate or linear-spathulate, crenulate at tip, up to .5 in. long, .25 in. broad; cocci obtusely keeled, minutely papillose; seeds with shallow furrows.....12. *rosea*.
- Limb of gland white, all subequal, rounded, sometimes 0; leaves green, but often with a red spot, elliptic oblong or obovate, obtuse, oblique at base, up to .5 in. long, .2 in. broad; cocci keeled, glabrous or slightly pubescent; seeds smooth.....13. *corrigioides*.
- Prostrate herbs with very small leaves; involucre solitary or in small axillary cymes; limb of gland minute or 0:—
 Stems hispidly hairy; capsules pubescent or hirsute; leaves areolate-reticulate:—
 Cocci rounded or only slightly obtusely keeled, covered with appressed stiff hairs; seeds 4-angled with faint furrows; leaves oblong or ovate, crenulate at tip, obliquely subcordate at base, up to .25 in. long, the nerves obscure.....14. *thymifolia*.
- Cocci prominently keeled, with stiff spreading hairs on the keels; seeds 4-angled, with deep furrows; leaves elliptic or obovate, crenulate, oblique at base, up to .3 in. long, 3-nerved, the nerves all prominent.....15. *prostrata*.
- Stem and capsules glabrous, the latter obtusely keeled; seeds obtusely 4-angled, glabrous, sometimes faintly furrowed; leaves elliptic or obovate, rounded or emarginate, oblique at base, rarely over .15 in. long, the nerves obscure.....16. *microphylla*.
- Shrubs or trees or plants with thickened underground stem, the branches often angular and with stipular spines; glands of involucre without a petaloid limb:—
 Stems not developed above ground, stout and cylindric, 6—18 in. or more long; leaves radical, obovate, cuneate, early deciduous; scapes erect, dichotomous, bracteate; involucre hemispheric, the lobes lacerate-multifid; glands 5, oblong; capsule glabrous; seeds ovoid, smooth.....17. *acaulis*.
- Stems well developed above ground:—
 Branches spreading, unarmed, cylindric; leaves 0 or small and linear-oblong, deciduous; involucre pedicelled, clustered in the axils of the branchlets; glands peltate; cocci subglobose, smooth, .3 in. long; seeds ovoid, smooth.....18. *Tirucalli*.
- Branches thick, fleshy, armed with stipular spines:—
 Main stems practically none but many branches from the base up to even 7 ft. high, 2 in. in diam., terete, smooth; spines in pairs from large conical tubercles, in spirals, the spines .25—.5 in. long, red, sharp, often with 2 smaller ones above; leaves small, fleshy, suborbicular, .3—.5 in. long, deciduous; glands oblong; capsule red, sharply angled.....19. *caducifolia*.
- Main stem present, thick and tree-like:—
 Leaves large, oblanceolate, usually at least 6 in. long; involucre usually in threes on a short fleshy peduncle, the lobes fimbriate, the glands transversely oblong:—
 Branches cylindric with pairs of straight spines inserted on flat corky bases, arranged in vertical lines; leaves obtuse.....20. *Nivulia*.
- Branches more or less angular with small pairs of spines on small corky bases, arranged in spiral lines; leaves shortly acute.....21. *neriifolia*.

Leaves small, usually very early deciduous; branches angular:—

Styles simple:—

Branchlets 3-winged with straight spines in pairs; leaves obovate, spatulate, mucronate, up to 2 in. long, .75 in. broad; bracteoles sheathing, laciniate.....22. *trigona*.

Branchlets 5-winged with narrow sharp spines; leaves oblanceolate, acute, mucronate, up to 2 in. long, .5 in. broad; bracteoles slender, fimbriate at tip.....23. *Cattimandoo*.

Styles bifid at apex:—

Branchlets thick and broad 3—5-winged, with sharp spines; leaves few, very small; glands fleshy, thick, spongily pitted, bracteoles sheathing, deeply laciniate.....24. *antiquorum*.

Branchlets rather slender, much twisted, 3—5-winged, with sharp spines, the wings thin, foliaceous; leaves minute, ovate; glands large, hard and thin, glabrous; bracteoles sheathing, fimbriate at tip

25. *torilis*.

Herbs with erect stems umbellately branched above, the lower leaves or sometimes all alternate, the upper opposite; glands of involucre without a petaloid limb:—

Glands of the involucre 2-horned; capsule smooth; seeds carunculate:—

Seeds with a white leprous tuberculate testa; leaves linear or linear-lanceolate, 1—1.5 in. long, .1—2 in. broad, the floral leaves shorter and broader in proportion; lobes of the involucre short, ovate, ciliolate.....26. *dracunculoides*.

Seeds with a smooth, bluish-grey to black testa; leaves linear-lanceolate or oblanceolate, 2—4 in. long, .25—.75 in. broad, the floral leaves broadly ovate-cordate, acute, mucronate; lobes of the involucre long, subquadrate ciliate

27. *Rothiana*.

Glands of the involucre not horned:—

Glands peltate; cocci rounded, smooth; leaves oblanceolate, acute, serrate, the upper larger, up to 1.5 in. long, those near the involucre ovate to cordate; lobes of the involucre narrow, ciliate, longer than the glands.....28. *peltata*.

Glands oblong; capsules smooth, the cocci rounded; seeds reticulate, carunculate; leaves obovate or spatulate, obtuse, serrulate, the floral larger, up to 2 in. long; lobes of the involucre fimbriate.....29. *helioscopia*.

1. EUPHORBIA PYCNOSTEGIA, Boiss.; F. B. I. v. 246.

W. Ghâts, hills of S. Canara and Malabar.

A slender branching herb, glabrous except the floral internodes and capsule, the leaves up to 1.5 in. long, .5 in. broad, floral leaves smaller, ovate; cocci hirsute.

Var. *laxa*, Boiss. Floral heads more open, cocci glabrous, also seeds.

Bababudan Hills of Mysore, at 5,000 ft. (Talbot, Meebold).

2. EUPHORBIA ZORNIOIDES, Boiss.; F. B. I. v. 246.

Bababudan Hills of Mysore at 3,500 ft. (Meebold); Anamalais (Beddome).

A slender glabrous herb, with woody stem, the leaves narrow, mucronate, floral leaves small, ovate, gradually smaller upwards, ciliate on the edges.

3. EUPHORBIA ELEGANS, Spr.; F. B. I. v. 146.

N. Circars and Deccan from Godavari to Kurnool, in shady places in deciduous forest.

An erect herb or undershrub with conspicuous floral leaves and pink flowers, the leaves scarcely 1 in. long.

4. EUPHORBIA FIMBRIATA, Heyne in Roth Nov. Sp. Pl. 227. *E. cristata*, Hook. f. in F. B. I. v. 247 in part.

Deccan, Sakrable in Mysore (Barber); Tinnevelly Ghâts (Beddome).

- A dwarf undershrub with thick rootstock and many short branchlets, the involucre very villous.
5. *EUPHORBIA CRISTATA*, Heyne; F. B. I. v. 247.
Deccan and Carnatic, from the Kistna river southwards, west to the E. slopes of the Gháts, in forest undergrowth, up to 3,000 ft.
A straggling undershrub with thick rootstock.
6. *EUPHORBIA LONGISTYLA*, Boiss.; F. B. I. v. 247.
Deccan, in the Ceded Districts, up to 2,000 ft. (Heyne, Wight, Gamble).
An erect delicate herb reaching 10 in. in height, with slender root and numerous filiform branches, the long styles conspicuous.
7. *EUPHORBIA NOTOPTERA*, Boiss.; F. B. I. v. 247.
W. Coast in rice-fields and other cultivated land, on laterite soil in S. Canara (Fischer).
A slender erect herb with narrow, usually deflexed leaves.
8. *EUPHORBIA LINEARIFOLIA*, Roth; F. B. I. v. 249.
Deccan, at Cumhuin in Kurnool (Bourne) also, but without geographical locality (Heyne and Wight).
A glabrous glaucous herb with thick rootstock and branches. Roth says that the limb is pink with a red spot.
9. *EUPHORBIA ATOTO*, Forst.; F. B. I. v. 248.
W. Coast, in S. Canara, Malabar and Travancore, on the sea-coast.
A fleshy shrub with long stout rootstock and stout much-branched stems.
10. *EUPHORBIA HYPERICIFOLIA*, Linn.; F. B. I. v. 249.
N. Circars, Deccan and Carnatic, west to the E. slopes of the Gháts, up to 3,000 ft., common.
A slender herb reaching 1—2 ft. high.
11. *EUPHORBIA HIRTA*, Linn. *E. pilulifera*, Linn.; F. B. I. v. 250.
All plains Districts, especially on roadsides and waste land, common.
A straggling ascending hispid herb reaching 1—2 ft. high.
12. *EUPHORBIA ROSEA*, Retz; F. B. I. v. 251.
N. Circars, coast of Ganjam; S. Deccan and Carnatic, on sandy soils, especially near the coast.
A herb with long rootstock and many prostrate branches, the styles long and conspicuous. The coast form (*E. auricularia*, Boiss.) has the two upper limbs of the glands shorter and broader and the leaves more rounded and fleshy.
13. *EUPHORBIA CORRIGIOLOIDES*, Boiss.; F. B. I. v. 251.
S. Deccan and Carnatic, usually near the coast, but also inland to Bellary.
A herb with stout rootstock and many branches which are often long and trailing with leaves in distinct pairs, often conspicuous with a red blotch.

14. *EUPHORBIA THYMIFOLIA*, Linn.; F. B. I. v. 252.
All plains Districts and on hills in Deccan and Carnatic at low elevations, often a roadside and garden weed.
An annual prostrate herb.
15. *EUPHORBIA PROSTRATA*, Ait.; F. B. I. v. 266.
Deccan and Carnatic, occasionally, usually probably as a weed in gardens. An introduced plant, native of W. Indies.
A prostrate herb.
16. *EUPHORBIA MICROPHYLLA*, Heyne; F. B. I. v. 252.
Circars, Deccan and Carnatic, especially near the sea and on river banks.
A glabrous herb with prostrate branches, spreading star-like from the root.
Var. *nilagirica*. *E. nilagirica*, Miq.; F. B. I. v. 265. A rather larger plant with larger leaves and more sharply keeled cocci.
Nilgiri Hills (Hohenacker), probably at low levels in dry places.
17. *EUPHORBIA ACAULIS*, Roxb. *E. fusiformis*, Buch.-Ham. in Don Prodr. 62; F. B. I. v. 257.
Bababudan Hills of Mysore (Law).
A dwarf unarmed glabrous herb, flowering in the hot season, the leaves up to 9 in. or more long, the tuber often very large, even to 2 ft.
18. *EUPHORBIA TIRUCALLI*, Linn.; F. B. I. v. 254.
Most plains Districts, naturalized and cultivated as a hedge plant, native of tropical Africa. Milk Bush.
A large shrub or small tree. Flowers very small, the bracteoles among the ♂ laciniate at tip; bark greenish-brown; wood white or grey, moderately hard, said to give a good powder charcoal. Vern. *Hind.* Sehnd; *Tam., Mal.* Tiru Kalli.
19. *EUPHORBIA CADUCIFOLIA*, Haines in Ind. For. xl. 154; Fischer in Kew Bull. 1925, 341.
Deccan, hills of Palnád in Gunjur, hills of Kurnool and Cuddapah, among rocks (Fischer).
A much-branched thorny shrub with smooth green bark. Vern. *Tel.* Kartai-jemadu.
20. *EUPHORBIA NIVULLA*, Buch.-Ham.; F. B. I. v. 255; Wt. Ic. t. 1862.
N. Circars and Deccan to Mysore and Coimbatore, on rocky hills in dry open forests; often also cultivated.
A tree with straight trunk reaching 10–30 ft., the branches whorled. Wood white, soft, even-grained. The milky juice is used in medicine. Vern. *Tam.* Kalli; *Kan.* Yelli Kalli.
21. *EUPHORBIA NERIIFOLIA*, Linn.; F. B. I. v. 255.
Cultivated and sometimes run wild, chiefly in Northern Districts.
A small tree 6–15 ft. high with whorled branches.
22. *EUPHORBIA TRIGONA*, Haw.; F. B. I. v. 256 in part; Wt. Ic. t. 1863.
Deccan, on dry rocky hills.
A small tree with thick trunk reaching 6–7 ft., the involucre in dichasioid cymes of 3, the middle one with ♀ flowers, the

others usually only ♂. The cocci are more or less compressed, the seeds smooth.

23. *EUPHORBIA CATTIMANDOO*, W. Elliot in Wt. Ic. t. 1993. *E. trigona*, Haw.; F. B. I. v. 256 *in part*.

N. Circars, dry hills about Vizagapatam (W. Elliot); Deccan, hills of Kistna and Kurnool.

‡An erect shrub or small tree, giving an abundant milk which hardens to a kind of gutta-percha.

24. *EUPHORBIA ANTIQUORUM*, Linn.; F. B. I. v. 255; Wt. Ic. t. 897.

Low hills and rocky ground in most dry Districts, also commonly cultivated as a hedge plant.

A small tree, reaching 25 ft. high, the involucre in short cymes of 3, the cocci compressed. Vern. *Hind.* Tidhara-Sehnd; *Tam.* Sadura-Kalli.

25. *EUPHORBIA TORTILIS*, Rottl. ex Wt. Ic. t. 898; F. B. I. v. 256. *Tel.* Pedda jamadu.

Carnatic, from Nellore to Thinnevelly, on dry hills.

An erect shrub with thin-winged branchlets bearing involucre in cymes of 3.

26. *EUPHORBIA DRACUNCULOIDES*, Lamk.; F. B. I. v. 262.

N. Circars and Deccan, on dry waste lands and in cultivated ground in the plains.

A much-branched glaucous herb with very narrow leaves.

27. *EUPHORBIA ROTHIANA*, Spr.; F. B. I. v. 263; Wt. Ic. t. 1864.

N. Circars, Mahendragiri Hill in Ganjam, 4,000 ft. (Fischer); Deccan, hills of Mysore and Coimbatore; W. Gháts, in all Districts, at 4,000—7,000 ft., usually in damp places.

An erect glabrous glaucous herb, the flowering branches whorled with conspicuous floral leaves.

Var. *pubescens*, Boiss. Branchlets and leaves softly pubescent. Coorg (Hohenacker).

28. *EUPHORBIA PELTATA*, Roxb.; F. B. I. v. 262.

Interior of the Coromandel Coast (Roxburgh), see Fl. Ind. and Icon. 1248 in Herb. Kew.

A small annual erect herb.

29. *EUPHORBIA HELIOSCOPIA*, Linn.; F. B. I. v. 262.

Nilgiri Hills, introduced and run wild, native of Europe and temperate Asia. Sun Spurge.

An erect annual herb.

Euphorbia pulcherrima, Willd., the Poinsettia, is a well-known ornamental garden shrub with bright crimson or occasionally yellow or white floral leaves. *E. heterophylla*, Linn., is an annual herb from Tropical America, which is often found as a weed in Indian gardens. It has narrow floral leaves, green near the apex and nearly reddish at base. *E. splendens*, Boj., is a small prickly very much branched shrub with showy crimson flowers, common in gardens in the plains. It is a native of Madagascar.

2. *Bridelia*, Willd.

Shrubs or trees, sometimes climbing; stems often spinose. *Leaves* alternate, entire, usually with prominent nerves and transverse nervules; stipules early deciduous. *Flowers* small, monoecious or dioecious, in axillary or spicate clusters, sessile or shortly pedicelled; bracts small, scale-like. *Calyx* of 5 valvate lobes. *Petals* 5, small, alternate with the calyx-lobes, in ♂ usually stalked, cucullate and dentate, in ♀ spathulate. *Disk* flat, the ♂ with an annular rim, the ♀ with an inner corona, erect and enclosing the ovary. *Stamens* 5, on an erect gonophore, the filaments radiating from it and surrounding a pistillode, anther-cells parallel. *Ovary* 2-celled; ovules 2 in each cell; styles 2, free or shortly united, forked or subentire. *Fruit* a drupe, with 1—2 usually single-seeded pyrenes. *Seed* with usually fleshy albumen; cotyledons thin, usually broad and truncate or emarginate; radicle superior.

Trees or shrubs; fruits globose or didymous, the pyrenes more or less furrowed; stipules narrow:—

Main nerves strong, straight, parallel, joining a marginal thickened one, more than 15 pairs, cross-nervules also many and parallel:—

Flowers in clusters in spikes, monoecious, the ♀ much larger than the ♂; leaves chartaceous, elliptic-oblong or obovate, acute obtuse or even retuse at apex, usually obtuse at base, glabrous or puberulous beneath, up to 9 in. long, 4 in. broad, main nerves often forked near the margin; drupe black, globose, about .25 in. in diam., the pyrene furrows curved and deep.....1. *retusa*.

Flowers in clusters in the leaf-axils, pedicelled or not, dioecious; leaves coriaceous, the main nerves close and regular; stipules long-acuminate, deciduous:—

Leaves elliptic-oblong, obtuse or emarginate at apex, obtuse or cordate at base, brown-tomentose beneath, up to 5 in. long, 2.5 in. broad; drupe black, depressed globose, .25 in. in diam., the pyrene furrows deep, the ridges branching from the middle one and curved.....2. *Roxburghiana*.

Leaves oblong, acute or obtusely acute at apex, usually acute at base, glabrous and cinereous-glaucous beneath, up to 3.5 in. long, 1.25 in. broad; drupe globose, .3 in. in diam., the pyrene furrows rather shallow, the ridges curved.....3. *cinerascens*.

Main nerves not markedly straight or parallel, often branched, but always eventually joining a marginal thickened one, less than 15 pairs, cross-nervules also more or less parallel; flowers monoecious, very small:—

Leaves oblong-lanceolate or oblanceolate, acute at apex, acute or obtuse at base, glaucous and pubescent beneath, up to 4 in. long, 1.5 in. broad; drupe globose, black, .2 in. in diam., the pyrene furrows deep, the ridges radiating from a prominent central one.....4. *tomentosa*.

Leaves rhombic-obovate or sometimes oblanceolate, acute at apex, long-cuneate at base, usually glabrous, up to 4.5 in. long, 2.5 in. broad; drupe globose, .25 in. in diam., the pyrene furrows shallow, the ridges rounded, curving from a central one.....5. *montana*.

Climbers; fruits oblong, the pyrenes smooth; flowers in long axillary or terminal spikes with small leaves and zig-zag rachises, usually monoecious, but the ♂ and ♀ on separate spikes:—

Disk of the ♀ flowers with a ring of bristles at the base within, the calyx enlarged in fruit; leaves elliptic-ovate or -obovate, acute at apex, rounded at base, fulvous tomentose beneath, up to 4 in. long, 2 in. broad, the main nerves 10—12 pairs, parallel, joining a marginal one, the transverse nervules also regular and parallel; drupe black, .5 in. long.....6. *stipularis*.

Disk of the ♀ flowers without a ring of bristles at the base within, the calyx not enlarged in fruit; leaves elliptic, obtuse at apex, rounded or cordate at base, fulvous-pubescent beneath, up to 5 in. long, 2.5 in. broad, the main nerves 7—10 pairs, parallel, joining a marginal one, the transverse nervules also more or less parallel; drupe black, .3 in. long.....7. *scandens*.

1. *BRIDELIA RETUSA*, Spreng.; F. B. I. v. 268 *in part*; Bedd. Fl. t. 260; Brand. For. Fl. t. 55. *Cluytia spinosa*, Roxb. Cor. Pl. t. 172.
All Forest Districts, especially in the N. Circars and in deciduous forests, though usually by streams and in ravines, in the hills up to 3,500 ft.
A small or moderate-sized tree, with conical thorns on the stems and branches when young. Bark grey or brown; wood grey to olive-brown, with a pretty silver grain, useful and durable. Vern. *Hind.* Kaj, Kassi; *Ur.* Kosi; *Tel.* Koramaddi, Verri Karaka; *Tam.* Mulu Maruthu; *Mal.* Mukkayini; *Kan.* Asana.
2. *BRIDELIA ROXBURGHIANA*, Gehrm. in Engl. Jahrb. xli, Beibl. 95, 30. *B. retusa*, Spr., var. *Roxburghiana*, Hook. f.; F. B. I. v. 268.
W. Ghâts, in all Districts of the hills up to 5,000 ft., especially on the E. side; hills of Mysore and N. Coimbatore; Shevaroy Hills of Salem.
A large tree, probably thorny when young, the branches with shining bark, the branchlets fulvous-tomentose.
3. *BRIDELIA CINERASCENS*, Gehrm. l. c. *B. retusa*, Spr., var. *glauca*, Hook. f.; F. B. I. v. 268.
Deccan, Palkonda Hills of Cuddapah (Fischer), Veligonda Hills of Nellore (M. S. Ramaswami), Kambakam Hills of Chingleput (K. Rangachari).
A moderate-sized tree, apparently thorny when young, the flowers greenish-yellow, the drupe purple-black.
4. *BRIDELIA TOMENTOSA*, Blume; F. B. I. v. 271.
N. Circars, in forest, Ganjam (Gamble); Palkonda Hills of Vizagapatam (Sir W. Elliot); Annavaram in Godavari (K. Rangachari).
A large shrub or small tree with nearly black slender branchlets, the leaves with about 10—12 pairs of curved parallel unbranched main nerves.
5. *BRIDELIA MONTANA*, Willd.; F. B. I. 269 *in part only*; Roxb. Cor. Pl. t. 171. *B. Hamiltoniana*, Wall.; F. B. I. v. 271.
N. Circars, Ganjam to Kistna in dry forests; Deccan, hills of Cuddapah and Kurnool, up to 3,000 ft.
A large much-branching shrub or small tree, the leaves rather thin and large, and the stem tree-like in moister or more shady places, the leaves thick and small and often yellowish and the stems bushy in open dry ones, the main nerves very oblique, 6 to 10 pairs, usually branched near the margin. Vern. *Tel.* Pantenga.
6. *BRIDELIA STIPULARIS*, Blume; F. B. I. v. 270, *in part*. *Cluytia scandens*, Roxb. Cor. Pl. t. 173, *not good*.
N. Circars, Palkonda Hills of Vizagapatam (J. Campbell, Gamble), Lamsingi Hills (A. W. Lushington, Rangachari).
A large climbing shrub, with fulvous-tomentose branches, often thorny when young, the leaves on flowering shoots small but often wanting.
7. *BRIDELIA SCANDENS*, Gehrm. *B. stipularis*, Hook. f.; F. B. I. v. 270 *in part, not of* Blume.

W. Ghats, S. Canara and Mysore to Travancore, up to 3,000 ft. A large climbing shrub with thorny stems and branches, the flowering spikes often long and distichous with small leaves.

3. *Cleistanthus*, Hook f.

Trees or shrubs. *Leaves* alternate, bifarious, entire. *Flowers* monoecious, small, in axillary clusters or spikes of clusters, sessile or the ♀ pedicelled. *Calyx* of 5 or sometimes 6 valvate lobes, in the ♀ cupular under the ovary. *Petals* alternate with the calyx-lobes, minute. *Disk* in ♂ flat or pulvinate, in ♀ with an inner corona, more or less enclosing the ovary. *Stamens* 5 or 6, on an erect gonophore, the filaments rising from it and enclosing a lobed pistillode; anther-cells parallel. *Ovary* 3-celled, usually with long hairs; ovules 2 in each cell; styles 3, free, bifid. *Fruit* a sessile or stipitate capsule with 3 2-valved cocci. *Seed* without aril or caruncle; albumen copious or scanty; cotyledons thin or fleshy, often folded.

Capsule large, .75—1 in. in diam., hard and woody, dark brown, shining; seed globose; calyx-lobes lanceolate, .25 in. long; petals minute, linear; leaves elliptic obovate or orbicular, often retuse at apex, up to 4.5 in. long, 3 in. wide; ovary glabrous.....1. *collinus*.

Capsule small, less than .5 in. in diam.; ovary villous:—

Flowers in clusters in axillary spikes; seed heart-shaped; calyx-lobes .1 in. long; petals minute, obovate; leaves ovate or lanceolate, acuminate at apex, acute or rounded at base, glabrous, up to 3.5 in. long, 1.5 in. broad.....2. *patulus*.

Flowers in axillary clusters:—

Branches slender; calyx-lobes .1 in. long; petals minute, ovate; leaves lanceolate, long-acuminate, glabrous, up to 4.5 in. long, 1.5 in. broad, the main nerves irregular, branched and reticulate, stipules very small...3. *travancorensis*. Branches rather thick, rufous-villous; calyx-lobes 1.25 in. long; petals spatulate; leaves oblanceolate, acuminate, glaucous and thinly pubescent beneath, up to 6 in. long, 1.75 in. broad, main nerves arched, 6—10 pairs, stipules linear-lanceolate, .2 in. long.....4. *malabaricus*.

1. *CLEISTANTHUS COLLINUS*, Benth.; F. B. I. v. 274. *Cluytia collina*, Roxb. Cor. Pl. t. 169.

N. Circars, common; Carnatic, in most Districts, in dry forests; Deccan, especially Hyderabad; Malabar (Bournes).

A small deciduous tree. Bark dark brown, rough; wood dark reddish-brown, hard and strong, valuable for houseposts and fences. The outer crust of the capsule is poisonous and used to kill fish. Vern. *Hind.* Garrar; *Ur.* Korada; *Tel.* Korei, Wodesha; *Tam.* Wodayu, Wodan.

2. *CLEISTANTHUS PATULUS*, Muell. Arg.; F. B. I. v. 279, *Amanoa indica*, Wt. Ic. t. 1911.

N. Circars, in Kallikota (Prain), Palkonda Hills of Vizagapatam (Gamble); Deccan, in Mysore, Kistna and Cuddapah (Beddome); Carnatic, Kambakam Hills in Chingleput, hills of Tinnevely (Rangachari), chiefly in ravines or dry evergreen forest.

A small or moderate-sized tree with horizontal branches. Bark thin; wood "colour of dry rose leaves" (Roxb.), hard and close-grained. The seeds have very thin albumen and large fleshy truncate cotyledons.

3. *CLEISTANTHUS TRAVANCORENSIS*, Jablonszky in Engl. Pflanzenreich iv. 147. viii. 21.
W. Gháts, evergreen forests of Travancore at 2,500 ft. (Bourdillon).
A small tree.
4. *CLEISTANTHUS MALABARICUS*, Muell. Arg.; F. B. I. v. 276.
W. Gháts, evergreen forests from the Gairsoppa Falls (Talbot) to Travancore (*vide* Bourdillon in "Trees Trav."), at 1,000—3,000 ft.
A large shrub or small tree with fulvous-hairy capsules.

4. *Actephila*, Blume.

Trees or shrubs. *Leaves* alternate, usually large, entire; stipules deciduous. *Flowers* monoecious or dioecious, ♂ in axillary clusters, short-pedicelled, ♀ solitary or few together, long-pedicelled, bracts small. *Calyx*-lobes 5, imbricate, in ♂ small and rounded, in ♀ longer and oblong or lanceolate, often unequal. *Petals* small, inserted under the disk, in ♂ oblong, in ♀ rounded. *Disk* broad, entire or lobed. *Stamens* 3—6 inserted on the disk, filaments shortly combined at the base in a gonophore enclosing a 3-cleft pistillode. *Ovary* sessile, 3-lobed; ovules 2 in each cell; styles short, free or connate at the base, entire or bifid. *Fruit* a hard septicidal capsule of 3 cocci. *Seeds* usually solitary in the cocci, 3-gonous, rounded on the outer face, flat on the 2 inner; testa loose and fragile, often with an inner one membranous; albumen 0 or very scanty; cotyledons fleshy, unequal, the interior one smaller.

ACTEPHILA EXCELSA, Muell. Arg.; F. B. I. v. 282. *A. neilgherrensis*, Wt. Ic. t. 1910.

W. Gháts, most Districts, in evergreen forests, and Shola woods, up to 6,000 ft.; Bababudan Hills of Mysore.

A small tree reaching a height of 25 ft., with greyish-brown bark. Leaves somewhat coriaceous, shining, variable, lanceolate obovate or oblanceolate, acute, glabrous, up to 7 in. long, 3 in. broad; capsules depressed globose up to 1.5 in. in diameter. The Mysore specimens agree best with Dalzell's type; the rest are all Wight's *neilgherrensis*, possibly distinct.

5. *Agyneia*, Vent.

Glabrous herbs; stems often angular or compressed. *Leaves* small, alternate, entire; stipules acuminate. *Flowers* minute, monoecious, ♂ in axillary clusters, ♀ larger, solitary; bracts numerous, stipule-like. *Calyx*-lobes 6. ♂ gland-dotted and white-margined, hooded on the bark, ♀ acute, dotted but hardly margined. *Petals* 0. *Disk* in ♂ 6-lobed, in ♀ 0. *Stamens* 3, central, connate, the filaments combined in a gonophore column; cells parallel, extrorse. *Ovary* ovoid, 3-celled, truncate; ovules 2 in each cell; styles 3, very short, bifid, sunk in the top of the ovary. *Fruit* a capsule, splitting into 3 2-valved cocci. *Seeds* 6, slender, curved, with an elongated hilum; testa double, outer white, corky, inner membranous; albumen fleshy; embryo curved, the cotyledons flat.

AGYNEIA BACCIFORMIS, A. Juss.; F. B. I. v. 285; Wt. Ic. t. 1893.

East Coast, in grassy pastures near the sea.

An annual or biennial herb with straggling branches and small oblong elliptic or obovate leaves about .5 in. long, the capsules ovoid obtuse .25 in long.

6. Pseudoglochidion, Gamble.

Evergreen trees or shrubs. *Leaves* alternate, bifarious, entire, very shortly petioled. *Flowers* small, dioecious, in axillary clusters. *Calyx* in ♂ flowers of 6 biseriate imbricate lobes; in ♀ also 6-lobed, but smaller. *Petals* 0. *Disk* in ♂ flowers conspicuous, of 6 fimbriate glands, in ♀ annular, crenate. *Stamens* 3, erect, slightly joined by their connectives or free, the filaments connate in a short column; anthers extrorse, the cells dehiscing longitudinally; the connective produced in an apiculus. *Ovary* ovoid, 3-celled; ovules 2 in each cell; styles connate in a cylindric column, minutely 6-toothed at apex. *Capsule* 3-4-celled; depressed. *Seeds* trigonous, rounded on the back, often pitted on the faces; cotyledons fleshy, unequal.

PSEUDOGLOCHIDION ANAMALAYANUM, Gamble in Kew Bull. 1925, 330.

W. Ghâts, Anamalai Hills, about 4,000 ft. (Barber, Fischer)

A small tree reaching a height of 15 to 20 ft., the leaves lanceolate, up to 3.5 in. long, 1.25 in. broad, regularly nerved, glaucous beneath; the capsule 3-4-lobed, glabrous and .3-.4 in. broad.

7. Chorisandra, Wight.

Shrub, branchlets pale and rough. *Leaves* membranous, glabrous, pinnately arranged on short slender branchlets; stipules minute. *Flowers* dioecious or monoecious, minute, ♂ in dense axillary fascicles with short filiform pedicels; ♀ also axillary, with long slender pedicels. *Calyx*-lobes 6, smaller and more rounded in ♂ than in ♀. *Disk* flattened, with 6 depressed lobes alternating with the calyx-lobes. *Stamens* 6, erect with long free slender filaments; anthers short, the cells dehiscing longitudinally. *Ovary* 3-celled; ovules 2 in each cell, pendulous from the middle of the axis; style short, 3-lobed, the lobes bifid with recurved branches. *Fruit* a 3-celled papery capsule, splitting into 6 valves, but often only 3-seeded. *Seeds* small; testa loose; cotyledons small in rough albumen.

CHORISANDRA PINNATA, Wt. Ic. t. 1994.

N. Circars, Deccan and Carnatic, from Vizagapatam southwards to Madras, westwards to Cuddapah and Kurnool. It is common and more or less gregarious on laterite soils, especially in hollows to the W. of the Pulicat Lake.

A low branching shrub with very pale rough bark, hard wood and small ovate or elliptic very thin and easily detached leaflets.

8. Neopeltandra, Gamble.

Slender undershrubs. *Leaves* alternate, membranous; stipules small, ciliate, caducous. *Flowers* axillary, monoecious, ♂ in short racemes covered with imbricating ciliate bracts, ♀ from below them,

solitary, long-pedicelled. *Calyx*-lobes 5, imbricate. *Disk* saucer-like, broad, lining the inside of the calyx. *Stamens* 5, the filaments connate below in a column, free above and spreading; anthers 2-celled, dehiscing longitudinally; pistillode 0. *Ovary* 3-celled; ovules 2 in each cell, pendulous; styles 3, bifid. *Fruit* a 3-celled small capsule, the cocci thinly crustaceous, splitting into two. *Seeds* 2 or usually only 1 in each cell; testa crustaceous, prominently pitted; albumen fleshy; cotyledons flat, elliptic, leafy, the radicle as long and curved.

Leaves ovate- or elliptic-lanceolate, long and sharply acuminate, acute or rounded at base, up to 6 in. long, 2 in. broad, main nerves 6—8 pairs; ♂ flowers with ovate ciliate bracts, ♀ solitary with pedicel about 1 in. elongating to 3 in. in fruit; capsules .25 in. broad; seed curved .65 in. long, obscurely pitted

1. *longipes*.

Leaves elliptic or ovate, acute at apex, rounded or acute at base, up to 2.5 in. long, 1.5—2 in. broad, main nerves 4—6 pairs, slender; ♂ flowers with lanceolate bracts; ♀ solitary, pedicels about .5 in., longer in fruit; capsule .1—1.5 in. broad; seed slightly curved, .05 in. long, strongly pitted.....2. *suberosa*.

1. *NEOPELTANDRA LONGIPES*, Gamble. *Phyllanthus longipes*, Muell. Arg.; F. B. I. v. 287. *Peltandra longipes*, Wt. Ic. t. 1891.

W. Ghâts, hills from Coimbatore to Anamalais and hills of Tinnevely in evergreen forests up to 6,000 ft.

A slender undershrub with white bark and very thin leaves.

2. *NEOPELTANDRA SUBEROSA*, Gamble. *Phyllanthus suberosus*, Wt. in Wall. Cat. 7910; F. B. I. v. 287.

Hills of the N. Circars, in Vizagapatam and Godavari; Deccan, Veligonda Hills of Nellore (Ramaswami); W. Ghâts, Bolampatti Hills of Coimbatore (Fischer), Pulney Hills (Bourne).

A very slender undershrub with pale bark, the leaves very membranous and variable in size.

9. *Phyllanthus*, Linn. (modified).

Herbs or shrubs. *Leaves* small, alternate, distichous, the branchlets resembling pinnate leaves; stipules narrow. *Flowers* very small, monoecious, in axillary clusters or solitary, bracteate. *Calyx* lobes 5—6, imbricate. *Petals* 0. *Disk* in ♂ of small glands, in ♀ of glands or annular. *Stamens* 3, more or less free or the filaments combined in a column; anthers oblong or didymous, dehiscing vertically or transversely. *Ovary* 3-celled; styles 3, free or connate at base, 2-fid. *Fruit* a capsule with 3 crustaceous or thin 2-valved cocci. *Seeds* trigonous, rounded at back.

Anthers erect, the cells dehiscing vertically, the filaments united in a column:—

Shrubs; seeds foveolate:—

Leaf branchlets 2—6 in. long; leaves oblong, obtuse or apiculate, .4—75 in. long, main nerves 6—8 pairs; styles spreading; seed-pits conspicuous

1. *polyphyllus*.

Leaf branchlets 1—3 in. long, or little more; leaves elliptic-oblong, obtuse, apiculate, .2—3 in. long, main nerves obscure; styles short; seed-pits very minute.....2. *Lawii*.

Herbs or small undershrubs:—

Capsules smooth, the seeds with concentric lines of minute tubercles, and minute cross-bars:—

Leaves glabrous, subcoriaceous, obovate or oblanceolate, cuneate, rounded or retuse at apex, mucronate, glaucous, up to 1.25 in. long; stipules lanceolate,

- peltate; ♂ flowers minute, fascicled, ♀ solitary, on filiform pedicels; anthers subsessile.....3. *maderaspatensis*.
 Leaves glabrous, membranous, elliptic or ovate, acute, up to 1.25 in. long; stipules lanceolate, decurrent; ♂ flowers minute, fascicled, ♀ solitary, on thickened pedicels; anthers free above.....4. *Rheedii*.
 Capsules verrucose, the seeds prominently transversely ridged and with faint cross-bars; leaves glabrous or hispid on the margins, chartaceous, oblong, apiculate, up to .75 in. long; stipules subulate; ♂ flowers very minute, ♀ larger, sessile; anthers sessile.....5. *urinaria*.
 Anthers subglobose, the cells dehiscing transversely or on a slant:—
 Stipules peltate, subsagittate; capsule more or less verrucose, seeds minutely tubercled; disk of ♂ of large flat glands; filaments free:—
 Disk of ♀ saucer-shaped, thin, wavy; style lobes recurved, flattened on the ovary:—
 Leaves elliptic, obtuse, apiculate, the margins thickened, the nerves 4–5 prominent, joining in arches, .2–.4 in. long, .1–.2 in. broad; ♂ flowers subsessile, ♀ pedicelled; capsule glandular.....6. *Narayanswamii*.
 Leaves linear-oblong, obtuse or acute at apex, apiculate, the margins thickened, the nerves invisible, .5–.75 in. long, .1–.3 in. broad; ♂ flowers few, minute, subsessile, ♀ more numerous, on filiform pedicels.....7. *simplex*.
 Leaves of upper branchlets elliptic, obtuse, about .3 in. long, of lower stems elliptic-oblong, up to .75 in. long, .4 in. broad, the nerves about 5 pairs, faint, glaucous beneath; ♂ flowers many, in fascicles, ♀ few, both on filiform pedicels.....8. *Gardneriana*.
 Disk of ♀ cushion-shaped, thick; style lobes erect, spreading; leaves elliptic or elliptic-oblong, obtuse, up to 2 in. long, 1 in. broad, the nerves about 7 pairs, glaucous beneath, glabrous or hispid; ♂ flowers fascicled, shortly pedicelled, ♀ long-pedicelled.....9. *Macraei*.
 Stipules not peltate, lanceolate; seeds with regular lines of very minute tubercles joined by minute cross-bars; filaments connate in a column:—
 Leaves coriaceous or fleshy, orbicular or obovate, obtuse or apiculate, scarcely .25 in. in diam.; disk of ♂ of minute glands, of ♀ cushion-shaped; style-arms recurved with short lobes.....10. *rotundifolius*.
 Leaves membranous, usually glaucous beneath:—
 Leaves usually broadly obtuse at apex, very variable in size but usually under .5 in. long, elliptic-obovate or -oblong, prominently distichous so that the branchlets resemble pinnate leaves; anthers transversely dehiscing; disk of ♂ of minute glands, of ♀ saucer-shaped with erect lobes; styles recurved.....11. *Niruri*.
 Leaves usually acute, sometimes rounded, at apex, elliptic or obovate, up to at most .75 in. long:—
 Stipules lanceolate, long-acuminate; flowers rather large, the calyx-lobes with prominent scarious margins; disk of ♂ flowers with star-like glands, of ♀ saucer-shaped, crenulate or lobed; staminal column long, anther-slits transverse; styles erect, shortly bifid.....12. *debilis*.
 Stipules ovate, acute or acuminate, small; flowers very small, the calyx-lobes with obscure scarious margins; disk of ♂ flowers with peltate glands, of ♀ cushion-like, broadly lobed; staminal column slender, anthers reniform; styles erect with slender lobes.....13. *Missionis*.

1. *PHYLLANTHUS POLYPHYLLUS*, Willd.; F. B. I. v. 290; Wt. Ic. t. 1895, fig. 2.

Deccan, hill forests of Kurnool, Cuddapah, Chittoor and Nellore, Kambakam Hill in Chinglepur; Carnatic, Javadi Hills in S. Arcot, S. to hills of Tinnevely, up to 4,000 ft.; E. slopes of Nilgiris.

A shrub or small tree somewhat resembling *Emblica officinalis* in leaf but quite different in fruit.

2. *PHYLLANTHUS LAWII*, Grah.; F. B. I. v. 290.

N. Circars, in Godavari and Kistna; Carnatic, hills of Salem;

- W. Gháts, Wynaad to Travancore, gregarious on the banks and in the beds of rocky rivers.
A straggling shrub with long purplish branches armed with stipular tubercles bearing small thorns, the flowers pink. Vern. *Mal. Uri*.
3. *PHYLLANTHUS MADERASPATENSIS*, Linn.; F. B. I. v. 292; Wt. Ic. t. 1895, fig. 3.
N. Circars, Deccan and Carnatic on dry lands, especially black cotton soils and near the sea coast.
An erect or decumbent herb, sometimes nearly an undershrub.
 4. *PHYLLANTHUS RHEEDII*, Wt. Ic. t. 1895, fig. I (*poor*); F. B. I. v. 293.
W. Gháts, most Districts from S. Canara to Nilgiris, Anamalais, and the hills of Tinnevely above 5,000 ft.
A slender branching erect herb, the calyx-lobes usually white-margined.
 5. *PHYLLANTHUS URINARIA*, Linn.; F. B. I. v. 293. *P. leprocarpus*, Wt. Ic. t. 1895, fig. 4.
All plains Districts, in forest undergrowth and among grasses, up to 3,000 ft.
An annual or perennial erect herb, with more or less sensitive leaflets, which are sometimes pink when young.
 6. *PHYLLANTHUS NARAYANSWAMI*, Gamble in Kew Bull. 1925, 329.
N. Circars, Rampa Hills of Godavari, at 4,500 ft. (V. Narayanswami), perhaps on rocks.
A small wiry undershrub with many branchlets from a stout rootstock.
 7. *PHYLLANTHUS SIMPLEX*, Retz.; F. B. I. v. 295. *Macraea oblongifolia*, Wt. Ic. t. 1902, fig. 1.
N. Circars and Carnatic from the Chilka Lake to Madras; Deccan, in N. Coimbatore, on hot dry soils, up to 3,000 ft. in hilly country.
A stiff almost woody herb with long flattened branches.
 8. *PHYLLANTHUS GARDNERIANUS*, Baill. *P. simplex*, var. *Gardneriana*, F. B. I. v. 295, *Macraea Gardneriana*, Wt. Ic. t. 1902, fig. 3. *M. ovalifolia*, Wt. Ic. t. 1902, fig. 4.
W. Gháts, in all Districts from S. Canara to Tinnevely, but especially common in Nilgiris, Anamalais and Pulneys, above 5,000 ft.
A slender undershrub with woody rootstock and long branches, the leaves smaller in size upwards, plants of dry hill tops often dwarfed and with very small leaves.
 9. *PHYLLANTHUS MACRAEI*, Muell. Arg.; F. B. I. v. 296. *Macraea Rheedii*, Wt. Ic. t. 1901.
W. Gháts, Sholas of the Pulney Hills at 5,000–7,000 ft. (Bourne, etc.); Agastiamalai Peak, Tinnevely (Barber). A shrub, apparently reaching 2–3 ft. in height, with long weak flattened branchlets and capsules prominently warted when wet, leaf margins sometimes ciliate.
Var. *hispidus*. Branchlets and leaves softly hispid, the latter usually cordate at base.

Pulney Hills, on the outer edges of woods (*Wight*), Levinge's Path, 7,000 ft. (*Munch*).

10. *PHYLLANTHUS ROTUNDIFOLIUS*, Klein; F. B. I. v. 299.
N. Circars and Carnatic, sands on the sea-coast.
A prostrate or slightly ascending fleshy herb with stout root-stock and long trailing branches.
11. *PHYLLANTHUS NIRURI*, Linn.; F. B. I. v. 298; Wt. Ic. t. 1894.
All plains Districts, a weed of gardens and cultivated land.
A branching annual herb reaching 12—18 in. high. It is often used in native medicine. Vern. *Hind.* Jar-amla.
12. *PHYLLANTHUS DEBILIS*, Herb. Ham.; F. B. I. v. 299.
N. Circars and Carnatic, in shady places in the hill forests, West to the E. slopes of the Ghâts.
An erect slender herb or undershrub with many very slender branchlets.
13. *PHYLLANTHUS MISSIONIS*, Hook. f.; F. B. I. v. 297.
W. Ghâts, on E. slopes, Coimbatore to Tinnevely, at low levels.
An erect undershrub with rather distant leaves.

P. spectosus, Jacq., is a shrub with flattened branches, often found in gardens in the plains.

10. *Reidia*, *Wight*.

Shrubs or undershrubs, usually with erect stems bearing many spreading branchlets towards the top. *Leaves* alternate, usually membranous; stipules small, often many and persistent. *Flowers* monoecious, axillary, ♂ and ♀ in fascicles, the ♂ with rather short filiform pedicels, the ♀ with longer pedicels widening upwards; bracts very small, often numerous and imbricate. *Calyx*-lobes in ♂ 4, in ♀ 6, persistent and sometimes enlarging in fruit. *Corolla* 0. *Disk* in ♂ of 4 glands alternate with the calyx-lobes, in ♀ of 6 glands combined in a fleshy ring or cup. *Stamens* 2 or 4, the filaments united in a column around a pistillode; anthers dehiscing horizontally. *Ovary* 3-celled, 2 ovules in each cell; styles 3, deeply 2-fid. *Fruit* a capsule of 3 thinly crustaceous 2-valved cocci. *Seeds* triangular, glabrous or appressed hairy; cotyledons oblong.

Calyx-lobes of ♂ dentate or lacerate:—

- Calyx*-lobes of ♂ narrow, deeply lacerate, of ♀ less cut; ♂ flowers very small on short pedicels rising from a tuft of imbricate bracts, several together in clusters on the lower part of the branchlets, ♀ flowers larger, at the ends of the branchlets; leaves ovate-lanceolate, acute, unequal at base, up to 2 in. long, glaucous beneath.....1. *Gageana*.
Calyx-lobes of ♂ suborbicular, lacerate, of ♀ less so; flowers few, in axillary clusters, but usually ♂ in lower, ♀ in upper axils; disk of ♀ cup-shaped; leaves ovate, acute, somewhat unequal at base, reticulate, up to 3 in. long, 1.25 in. broad.....2. *fimbriata*.
Calyx-lobes of ♂ orbicular-ovate, dentate, of ♀ slightly toothed; flowers few, ♂ in lower axils, ♀ near the ends of the branches; disk of ♀ cushion-shaped; fruit large, about 1 in. in diam.; leaves ovate-lanceolate, acuminate, unequal-sided, glaucous beneath, up to 2.5 in. long, 1.5 in. broad.....3. *megacarpa*.

Calyx-lobes of ♂ not dentate or lacerate:—

Leaves large, at least 1 in. long; flowers usually fascicled:—

Calyx-lobes of ♀ greatly enlarged in fruit and closely imbricate; disk in ♂

annular, in ♀ saucer-shaped; leaves elliptic or elliptic-oblong, acute or obtuse, rounded at base, equal-sided, up to 2.5 in. long, 1 in. broad.....4. *macrocalyx*. Calyx-lobes of ♀ larger than those of ♂ but less enlarged in fruit.

Flowers of both ♂ and ♀ axillary to the leaves, the ♀ rather large; calyx-lobes ovate, glandular-striate, disk in ♂ broadly 4-lobed, in ♀ flat; leaves ovate, acute, obtuse at base, glaucous beneath, up to 2 in. long, 1.25 in. broad.....5. *Beddomei*.

Flowers in leaf-axils and also on long terminal leafless branchlets with linear bracts and stipules; calyx-lobes orbicular, disk tubercled; leaves triangular-ovate, acuminate, rounded at base, nearly equal-sided, reticulately nerved, up to 2 in. long, 1 in. broad.....6. *Bailloniana*.

Leaves small, under 1 in. long; branchlets prominently rough with many stipules; flowers solitary:—

Capsule glabrous; calyx-lobes of ♂ ovate, of ♀ oblong, reflexed after flowering; disk-lobes of ♂ small and distinct, of ♀ a small ring; leaves obliquely unequally obovate, acute at base, glaucous beneath, up to .75 in. long

7. *longiflora*.

Capsule densely covered with soft branched hairs:—

Calyx-lobes ovate acuminate ciliate; disk-glands truncate, dotted; leaves obliquely ovate-oblong, apiculate, pale beneath, softly villous, up to 1 in. long, .5 in. broad.....8. *floribunda*.

Calyx-lobes broadly ovate, short, glabrous, with few pellucid dots; disk-glands truncate, dotted; leaves obliquely ovate-falcate, long-apiculate, pale beneath, up to .4 in. long, .2 in. broad.....9. *stipulacea*.

1. *REIDIA GAGEANA*, Gamble in Kew Bull. 1925, 331.
W. Gháts, hills of Travancore and Tinnevely, in evergreen forest at about 2,000 ft. (Lawson, Beddome).
An undershrub, remarkable for the densely clustered ♂ flower with much lacerate calyx-lobes in ♂, less so in ♀, the ends of the branchlets leafless, but many-stipular.
2. *REIDIA FIMBRIATA*, Wt. Ic. t. 1904, fig. 1. *Phyllanthus fimbriatus*, Muell. Arg.; F. B. I. v. 302.
W. Gháts, Sispara Ghát in Nilgiris, at 4,000 ft. (Beddome, Gamble).
A glabrous shrub, the capsule nearly .25 in. in diam.
3. *REIDIA MEGACARPA*, Gamble in Kew Bull. 1925, 332.
W. Gháts, Devala in S.E. Wynaad at 3,000 ft. (Gamble).
A glabrous undershrub with large pale-coloured capsule, soon splitting, the seeds appressed-hairy.
4. *REIDIA MACROCALYX*, Gamble, n. comb. *Phyllanthus macrocalyx*, Muell. Arg.; F. B. I. v. 301. *R. latifolia*, Wt. Ic. t. 1904, fig. 2? Bababudan Hills, Mysore (Law.); Sivagiri Hills, Tinnevely (Wight).
A much-branched undershrub.
5. *REIDIA BEDDOMEI*, Gamble in Kew Bull. 1925, 331.
Chokampatti Hills of Tinnevely, at 5,000 ft. (Beddome); hills of Travancore (Bourdillon).
A glabrous undershrub.
6. *REIDIA BAILLONIANA*, Gamble, n. comb. *Phyllanthus Baillonianus*, Muell. Arg.; F. B. I. v. 300.
W. Gháts, hills of Tinnevely.
A shrub reaching 3—4 ft. in height, the leaves often marbled with white and purple, the fruit .25 in. long.

7. REIDIA LONGIFLORA, Gamble, n. comb. *Phyllanthus longiflorus*, Heyne; F. B. I. v. 302. *R. ovalifolia*, Wt. Ic. t. 1904, fig. 3 (not good).
W. Gháts, hills of Travancore and Tinnevely about 2,000 ft.
A small bush about 2 ft. high with pretty pink flowers (Bourdillon).
8. REIDIA FLORIBUNDA, Wt. Ic. t. 1903. *Phyllanthus Wightianus*, Muell. Arg.; F. B. I. v. 303.
Carnatic, Melpat in S. Arcot, Shevaroy Hills, Kollimalai Hills;
W. Gháts on E. side of Nilgiris and Pulneys, at about 2,000—4,000 ft.
A branching shrub, the branchlets rough with scars and stipules, the flowers red, the leaves with a pink tinge.
9. REIDIA STIPULACEA, Gamble in Kew Bull. 1925, 332.
W. Gháts, Anamalai and Pulney Hills, in thick undergrowth.
A straggling shrub with very rough branchlets having long and persistent brown stipules.

11. *Prosorus*, Dalz.

Trees. *Leaves* alternate, thin, deciduous. *Flowers* dioecious, small, ♂ numerous, in axillary fascicles with capillary pedicels, ♀ solitary or few together, axillary, pedicels long and stouter. *Calyx*-lobes 4 in both sexes. *Disk* annular, fleshy. *Stamens* 4, with free filaments, anthers oblong, extrorse, the cells dehiscing longitudinally. *Ovary* 3-celled; ovules 2 in each cell; styles short, bifid, the branches recurved. *Fruit* a globose capsule with thin epicarp, 6-seeded. *Seeds* irregularly trigonous, arillate, blue; albumen coarse; cotyledons small, flat.

PROSORUS INDICUS, Dalz. *Phyllanthus indicus*, Muell. Arg.; F. B. I. v. 305.

W. Gháts, Anamalai Hills (Beddome), hills of Tinnevely (Wight), Coorg and Wynaad (*vide* Beddome).

A small deciduous tree with membranous distichous elliptic or ovate acute leaves up to 6 in. long, 3 in. broad.

12. *Kirganelia*, Baill.

Shrubs, usually climbing or straggling. *Leaves* alternate, small or moderate-sized, distichous, thin; stipules lanceolate. *Flowers* monoecious, ♂ and ♀ mixed, in axillary clusters, sometimes in pairs or solitary, the clusters sometimes appearing racemose from the absence of leaves; pedicels filiform. *Calyx*-lobes 5, imbricate, the 3 inner often the larger. *Petals* 0. *Disk* in ♂ or ♀ of 5 fleshy glands. *Stamens* 5, in 2 series, the outer with free filaments, the inner 2 or 3 with the filaments connate in a column; anthers dehiscing longitudinally. *Ovary* 5—12-celled; ovules 2 superposed in each cell; stigmas as many or half as many as the cells, minute, sessile, 2-lobed. *Fruit* a fleshy 5—12-celled berry, the seeds superposed. *Seeds* trigonous; testa crustaceous, albumen fleshy; cotyledons flat, truncate.

KIRGANELIA RETICULATA, Baill. *Phyllanthus reticulatus*, Poir.; F. B. I. v. 288. *Anisonema multiflorum*, Wt. Ic. t. 1899.

All plains Districts, especially in hedges or waste places near villages and in thickets along streams.

A straggling shrub with slender branches, small elliptic obovate or orbicular or spatulate thin leaves and a purple fleshy berry about .2 in. in diam. Bark brown, thin; wood reddish-white, hard. Vern. *Hind.* Panjuli; *Tel.* Nella purududu, Phulsar; *Tam.* Pula, Pullanti.

13. *Emblica*, Gaertn.

Trees, branchlets distichous. *Leaves* small, pinnately arranged on the branchlets; stipules minute, scarious. *Flowers* very small, monoecious, in axillary fascicles, ♂ and ♀ mixed or frequently ♀ in lower and ♂ in upper axils of present or fallen leaves. *Calyx*-lobes 5–6, oblong. *Petals* 0. *Disk* in ♂ 0 or of minute glands alternate with the calyx-lobes, in ♀ cupular, the margin lacerate. *Stamens* 3, the filaments connate in a column, the anthers cohering by the connectives, which end in an apiculus, cells distinct dehiscing longitudinally. *Ovary* 3-celled; ovules 2 in each cell; styles connate at base with broad recurved twice-branched arms. *Fruit* depressed-globose, fleshy, with 3 bony 2-valved cocci. *Seeds* 6, trigonous; albumen fleshy; cotyledons flat, broad, cordate or truncate.

Leaves on the branchlets very many, 100 or more sometimes, linear oblong, apiculate, .3–.75 in. long, about .1 in. broad; glands in ♂ very small; style-arms in ♀ thick and twice bifid, sometimes broad, spreading.....1. *officinalis*.
Leaves on the branchlets many, up to about 50, elliptic-oblong, rounded or retuse at apex, .5–.9 in. long, .2–.3 in. broad; glands in ♂ larger; style-arms in ♀ slender, usually twice bifid, recurved.....2. *Fischeri*.

1. *EMBLICA OFFICINALIS*, Gaertn.; Wt. Ic. t. 1896. *Phyllanthus emblica*, Linn.; F. B. I. v. 288; Bedd. Fl. t. 258; Brand. For. Fl. t. 52.

N. Circars, Deccan and Carnatic, in dry deciduous forests and up to 4,000 ft. as on Mahendragiri; also in W. Ghâts, occasional on dry slopes. Emblic Myrabolam.

A small or moderate-sized deciduous tree, the branchlets and rhachises villous. Bark light grey, exfoliating; wood red, hard and close-grained, useful for poles, implements and furniture, and good under water. The fleshy fruits are .5–1 in. in diam., and are used for tanning and sometimes eaten. Vern. *Hind.* Aonla; *Ur.* Oura, ounla; *Tel.* Usiriki; *Tam.* Nelli.

2. *EMBLICA FISCHERI*, Gamble in Kew Bull.

Carnatic, Kambakam Hills of Chingleput, Veligonda Hills of Nellore (M. Ramaswami); Deccan, hills of N. Coimbatore (Fischer); W. Ghâts, Anamalai Hills to 3,000 ft. (Barber).

A small tree with rather large leaves, the branches pale brown, rough, the fruit not known.

14. *Fluggea*, Willd.

Shrubs, unarmed or thorny, branchlets angular. *Leaves* alternate, entire, distichous. *Flowers* dioecious, minute, pedicelled, axillary, ♂ in clusters, ♀ subsolitary. *Calyx*-lobes 5, imbricate, subpetaloid. *Petals* 0. *Disk* in ♂ of 5 or less glands alternate with the stamens; in ♀ annular

flat, toothed. *Stamens* 5, rarely less, the filaments free, exserted; anthers erect, the cells dehiscing longitudinally. *Ovary* 1—3-celled; styles free, recurved, usually 2-fid; pistillode in ♂ erect 2—3-fid. *Fruit* globose, coriaceous or outside fleshy, separating into distinct 2-valved cocci. *Seeds* triquetrous; testa crustaceous; albumen scanty; embryo curved, the cotyledons flat.

Unarmed; leaves 1—3 in. long, 1.5 in. broad, elliptic or obovate, rounded at apex; main nerves 5—7 pairs; fruits usually dry and very small, but some larger and with a fleshy pericarp.....1. *virosa*. Branchlets ending in spines; leaves .5—1 in. long, rarely more, obovate or orbicular, sometimes emarginate, glaucous, reticulate; fruit dry, globose, white, .25 in. in diam.....2. *Leucopyrus*.

1. *FLUGGEA VIROSA*, Baill. *F. microcarpa*, Bl.; F. B. I. v. 328.

All dry Districts, in deciduous forest and second-growth areas, in the hills to 4,000 ft.

A small tree or large shrub, the leaves very variable in size and shape. Bark smooth, thin, reddish-brown; wood red, hard, close-grained, useful for agricultural tools. Vern. *Hind.* Dalme.

2. *FLUGGEA LEUCOPYRUS*, Willd.; F. B. I. v. 328; Wt. Ic. t. 1875.

All dry Districts, in open places, especially near the coast, rising in the hills to 3,000 ft.

A large stiff straggling shrub, the ends of the branchlets sharply spinous, the fruits white. Wood hard and close-grained. Vern. *Hind.* Hartho; *Tel.* Tella purugudu; *Tam.* Madpulantti.

15. *Antidesma*, Linn.

Small trees or shrubs. *Leaves* alternate, entire; stipules narrow. *Flowers* dioecious, very small, in slender, axillary or terminal, simple or branched spikes or racemes. *Calyx*-lobes 3—5, rarely more. *Petals* 0. *Stamens* 2—5, inserted on or within the disk; filaments exsert; connective broad, lunate, the anther-cells ending its wings, dehiscence transverse. *Disk* annular or cushion-like. *Ovary* 1-celled; ovules 2 in each cell; stigmas 2—4, usually short; pistillode in ♂ clavate or globose or 0. *Fruit* a small more or less compressed drupe, crowned by the lateral or terminal stigmas. *Seed* small; albumen fleshy; cotyledons broad, flat.

Stamens inserted in hollows of the disk:—

Stamens 3—5, usually 3:—

Spikes of ♂ flowers slender, of ♀ short, the clusters close; leaves coriaceous, shining, ovate, obtusely acuminate, mucronate, up to 5 in. long, 2 in. broad, but often much smaller, main nerves about 10 pairs joined in arches and reticulate.....1. *zeylanicum*.

Racemes of ♂ flowers long, of ♀ long, the clusters distant; leaves chartaceous, shining above, elliptic-oblong, acuminate, mucronate, up to 9 in. long, 3 in. broad, main nerves 7—8 pairs, oblique, prominent, looped and with transverse nervules.....2. *Menasu*.

Stamens 2; flowers in slender racemes; leaves thin, dull, elliptic or obovate, acute, up to 4 in. long, 2 in. broad, main nerves 5—8 pairs, faint.....3. *diandrum*.

Stamens inserted within the disk:—

Disk of 5 free lobes, pubescent; stamens 4—7; flowers in villous panicle spikes; leaves orbicular obovate or oblong, obtuse or emarginate, up to 3 in. in diam., softly fulvous-tomentose, main nerves 5—7 pairs.....4. *Ghaesembilla*.

Disk lobed, surrounding the 3—5 stamens and a central truncate pistillode; ♂

flowers in rather thick glabrous spikes, the ♀ racemed; leaves elliptic oblong or obovate, acute or acuminate, usually shining, up to 7 in. long, 2.5 in. broad, main nerves about 8 pairs, curved and looped.....5. *Bunius*.

1. *ANTIDESMA ZEYLANICUM*, Lamk. *A. Alexiteria*, Linn. *in part*; F. B. I. v. 359.

Carnatic, Kambakam Hill in Chingleput, at 2,000 ft. (Fischer); W. Gháts, W. Nilgiris to the hills of Travancore and Tinnevely, in evergreen forests.

A small tree reaching 25 ft. high, the small drupe red.

2. *ANTIDESMA MENASU*, Miq.; F. B. I. v. 364.

W. Gháts, in all Districts, in evergreen forests up to 6,000 ft.; hills of N. Coimbatore; Shevaroy Hills of Salem.

A small branching tree with a red edible drupe. Wood darkish-red (Bourdillon). Vern. *Mal.* Puthara vál.

3. *ANTIDESMA DIANDRUM*, Roth; F. B. I. v. 361. *A. lanceolarium*, Wall.; Wt. Ic. t. 766 (not typical). *Stilago diandra*, Roxb. Cor. Pl. t. 166.

N. Circars, Deccan and Carnatic in deciduous forests at low levels, to South Travancore; W. Gháts, on lower eastern slopes, scarce in Malabar.

A small deciduous tree with thin leaves pleasantly acid and purplish-red edible fruits. Bark smooth, grey; wood pinkish-grey, hard and close-grained. Vern. *Hind.* Amári; *Ur.* Nuniári; *Tel.* Pellagumudu.

4. *ANTIDESMA GHAESEMBILLA*, Gaertn.; F. B. I. v. 357. *A. paniculatum*, Roxb.; Wt. Ic. t. 820. *A. pubescens*, Roxb. Cor. Pl. t. 167; Wt. Ic. t. 821.

N. Circars, Deccan and Carnatic, in deciduous forests at low elevations; W. Coast, in Travancore and Malabar.

A small deciduous tree with a red-purple edible small drupe. Bark grey or pale brown; wood red, the heartwood darker. Vern. *Hind.* Umtoa; *Ur.* Nuniári; *Tel.* Polari, pulsar, Kathupulitsi.

5. *ANTIDESMA BUNTUS*, Spr.; F. B. I. v. 358; Wt. Ic. t. 819.

N. Circars, hills of Vizagapatam, at 4,500 ft. (A. W. Lushington); W. Gháts, Pulney Hills and hills of Tinnevely.

A small evergreen tree with reddish drupe.

16. *Hemicyclia*, W. & A.

Trees or shrubs. *Leaves* evergreen, alternate, entire or slightly toothed, usually unequal at base. *Flowers* dioecious, ♂ in clusters in the axils of the leaves or on the branchlets below them, ♀ usually solitary, pedicels in ♀ longer than in ♂, often lengthened in fruit. *Calyx*-lobes usually 4, sometimes 5, imbricate, the inner usually the larger. *Petals* 0. *Stamens* 4–24, inserted round the disk, filaments free; anthers erect, the cells parallel. *Disk* flat or saucer-shaped, often crenate on the margins. *Ovary* obliquely ovoid, 1-, rarely 2-celled; ovules 2 in each cell; stigma 1, sessile or on a short style, broadly reniform or semi-orbicular, flat or recurved. *Fruit* a globose, obovoid

or ellipsoid drupe with hard endocarp. Seed usually solitary, arillate; albumen fleshy, embryo straight; cotyledons broad, flat.

Stamens 6—12:—

Leaves obtuse, very coriaceous, glabrous, elliptic, rounded or cordate at base, entire or sometimes repand-toothed, nerves very obscure, up to 3 in. long, 2 in. broad; calyx-lobes small, ciliate; stigma orbicular, peltate, crenulate; fruit .3 in. in diam., globose, red.....1. *sepiaria*.

Leaves acute or acuminate, coriaceous:—

Leaves entire, nerves prominent and reticulate; calyx-lobes densely fulvous-tomentose; stigma mushroom-shaped:—

Pedicels slender, of ♂ up to .5 in., of ♀ longer, in fruit 1—2 in.; leaves glabrous, elliptic or lanceolate, abruptly and obtusely acuminate at apex, slightly unequal at base, main nerves 10—12 pairs, up to 5 in. long, 2.5 in. broad; clusters about 5—6 flowers; fruit obovoid, .75—1 in. long...2. *elata*.

Pedicels short, about .25 in., tawny-villous; clusters about 3—4 flowers:—

Leaves elliptic-oblong, obtusely acute, unequal at base, up to 6 in. long, nearly 2 in. broad, main nerves about 10—15 pairs.....3. *venusta*.

Leaves lanceolate, obtusely acuminate, the point often twisted, the base slightly unequal, up to 3.5 in. long, 1.5 in. broad, main nerves about 8 pairs with fine reticulation; fruit obovoid or ellipsoid, .7 in. long, its pedicel .5 in.....4. *Wightii*.

Leaves crenate-serrate, glabrous, ovate-lanceolate, acuminate, slightly unequal at base, up to 3 in. long, 1.5 in. broad, main nerves 8—10 pairs, obscure; clusters up to 8 flowers, the pedicels slender, villous; calyx-lobes thin, ciliate; fruit ovoid, red, glabrous, .5 in. long.....5. *travancorica*.

Stamens about 24; leaves entire, ovate, obtusely and often retusely acuminate, unequal at base, minutely reticulate beneath, up to 2.5 in. long, 1.25 in. broad, main nerves 5—6; clusters about 4—6 flowers, the pedicels .25 in. long; calyx-lobes fulvous-pubescent.....6. *Porteri*.

1. *HEMICYCLIA SEPIARIA*, W. & A.; F. B. I. v. 337; Wt. Ic. t. 1872 ♂.
N. Circars, Deccan and Carnatic, in dry evergreen and semi-evergreen forests, eastwards to the drier slopes of the Ghâts.
A small evergreen tree or branching shrub. Bark grey, thin, smooth; wood white with a greyish-brown heart-wood, very hard and close-grained, like boxwood, but apparently little used except for fuel. Vern. *Tel.* Bira; *Tam.* Virai; *Kan.* Hira.
2. *HEMICYCLIA ELATA*; Bedd. Fl. t. 279; F. B. I. v. 339.
W. Ghâts, forests of the Wynaad at 2,000—4,000 ft.; Anamalais and hills of Travancore and Tinnevely.
A lofty straight glabrous tree reaching 90—100 ft. in height (Bedd.), with shining leaves, the reticulated secondary nerves not very prominent. The wood is said to be strong and suitable for building. Bourdillon likens it to box.
3. *HEMICYCLIA VENUSTA*, Thw.; F. B. I. v. 339. *Astylis venusta*, Wt. Ic. t. 1992.
W. Ghâts, W. slopes of Nilgiris in Ochterlony Valley (Wight) and on Sispara Ghât (Beddome) about 3,000—5,000 ft.
A shrub or small tree with many often drooping branches, the reticulated nervation irregular but not very prominent.
4. *HEMICYCLIA WIGHTII*, Hook. f.; F. B. I. v. 339.
W. Ghâts, Anamalai and Ayamalai Hills and hills of Travancore at 3,000—5,000 ft., in evergreen forests.
A small or moderate-sized tree reaching 40 ft. in height. Stem fluted; bark white, smooth, thin; wood pale grey, hard and

close-grained, but liable to split, used for posts. Vern. *Tam.* Vellelambu; *Mal.* Vella Kasavu.

5. *HEMICYCLIA TRAVANCORICA*, Bourd. Trav. Trees, 329.

W. Ghâts, evergreen forests of S. Travancore near Ariyankavu at 1,000 ft. (Bourdillon) in evergreen forests.

A medium-sized graceful tree. Bark pale brown, smooth; wood greyish-white, hard and close-grained. Vern. *Tam.* Vellei pillai.

6. *HEMICYCLIA PORTERI*, Gamble in Hook. Ic. t. 2701.

Carnatic, Warsanad Valley, Madura, near streams at 2,000 ft. (Ported). Cegilwood.

A small evergreen tree, the flowers larger. Bark grey, thin, peeling off in flakes; wood yellowish-white, hard and close-grained, used in building.

17. *Cyclostemon*, Blume.

Trees. *Leaves* alternate, entire or toothed, base often unequal-sided. *Flowers* dioecious, in axillary or lateral clusters, the lateral ones often on tubercles on old wood. *Sepals* 4–6, imbricate, the buds globose. *Petals* 0. *Stamens* few or many, inserted round a rather broad disk; anthers with parallel cells. *Disk* annular or saucer-shaped, sometimes with reflexed marginal lobes, often ribbed. *Ovary* 2–4-celled; ovules 2 in each cell; style short or elongate; stigmas dilated, spreading or connate and peltate. *Fruit* a subglobose ovoid or oblong indehiscent drupe, the pericarp crustaceous, endocarp granular; cocci 2–4, usually 2. *Seed* usually solitary in the cells; testa thin; albumen thick, fleshy; cotyledons broad and flat.

Flowers axillary; disk glabrous with 7–10 stamens round it; ♂ flowers in clusters, ♀ solitary, the ovary fulvous-tomentose; leaves subcoriaceous, elliptic or elliptic-oblong, obtuse or obtusely acute, up to 6 in. long, 2.5 in. broad, main nerves 12–15 pairs, reticulate between.....1. *assamicus*.
Flowers sometimes axillary, but usually in clusters on old wood:—

Disk small, fulvous-villous; stamens many:—

Flowers sessile or very nearly so, calyx fulvous-villous; drupe about 1 in. in diam.; leaves and branchlets glabrous; leaves coriaceous, oblong, abruptly acuminate at apex, entire or distantly serrate, up to 9 in. long, 3 in. broad, main nerves about 10 pairs joined by prominent reticulation...2. *macrophyllus*.
Flowers pedicelled, the pedicels .25 in. long; leaves on nerves beneath and branchlets fulvous-villous; calyx tomentose; leaves subcoriaceous oblong, abruptly obtusely acuminate at apex, entire or distantly serrate, up to 9 in. long, 3 in. broad, main nerves about 9 pairs joined by not prominent reticulation

3. *malabaricus*.

Disk large, glabrous, radiately ribbed and with inflexed marginal lobes; ♂ flowers pedicelled, ♀ nearly sessile; calyx glabrous except the ciliate margins; drupe 1.5–2 in. in diam.; leaves coriaceous, glabrous, oblong or elliptic-oblong, abruptly obtusely acuminate, entire or distantly serrate, up to 8 in. long, 3 in. broad, main nerves 8–10 pairs, reticulation prominent.....4. *confertiflorus*.

1. *CYCLOSTEMON ASSAMICUS*, Hook. f.; F. B. I. v. 342.

N. Circars, Mahendragiri Hill in Ganjam at 4,500 ft. and Palkonda Hills in Vizagapatam, at 2,000 ft. (Gamble), in most places.

A small branching evergreen tree with shining leaves and scarlet fruit .5–.75 in. long.

2. *CYCLOSTEMON MACROPHYLLUS*, Bl. ; F. B. I. v. 340 ; Bedd. Fl. t. 278.
W. Gháts, Coorg and Wynaad to the Anamalais and hills of Tinnevely and Travancore, at 2,000—4,000 ft., in evergreen forests.
A large evergreen tree with fluted stem and rough yellow fleshy fruit 1 in. in diam. Bark grey ; wood yellowish-brown, hard.
Vern. *Mal.* Mala payin.
3. *CYCLOSTEMON MALABARICUS*, Bedd. ; F. B. I. v. 341 ; Bedd. Ic. t. 183.
W. Gháts, hills of Tinnevely and Travancore, at 3,000—5,000 ft., in evergreen forests, at higher elevations than the last.
A medium-sized tree with very oblong leaves and a tomentose fruit 1 in. in diam.
4. *CYCLOSTEMON CONFERTIFLORUS*, Hook. f. ; F. B. I. v. 341.
W. Gháts, Chenat Nair Forest, Malabar (Lobo), northwards to Kanara, southwards to Travancore (Bourdillon), in evergreen forest.
A large tree with a large yellow fruit, the stigmas of the ♀ 2, large and semicircular.

18. *Sauropus*, Blume.

Shrubs or undershrubs. *Leaves* alternate, distichous, membranous, entire ; stipules minute. *Flowers* monoecious, minute, axillary, pedicelled, clustered or solitary. *Calyx* 6-lobed, ♂ disciform, urceolate or turbinate, the bases of the lobes with thickened folds sometimes reflexed ; ♀ larger and accrescent. *Petals* 0. *Disk* 0. *Stamens* 3, the filaments combined in a trigonous column, the anthers seated on the angles, the cells linear. *Ovary* ovoid or globose, 3-celled, rounded or concave at the apex ; ovules 2 in each cell ; styles 3, on the angles of the top of the ovary, the arms curved. *Fruit* a globose or depressed fleshy or coriaceous capsule, 6-valved or rupturing irregularly, with 6 trigonous crustaceous cocci. *Seeds* with fleshy albumen ; cotyledons broad, flat.

Apex of the ovary with 3 style-bearing produced angles ; leaves triangular lanceolate from a broad base, up to 5 in. long, 2 in. broad, glaucous beneath, with 6—7 main nerves ; fruit white, .5—75 in. in diam.....1. *androgynus*.
Apex of the ovary broad, the margin crenulate, the style-bearing angles widely separate:—

Calyx-lobes narrowly triangular, acute, the folds reflexed ; leaves elliptic or suborbicular, about .5—1 in. in diam., glabrous ; fruit globose, .3 in. in diam.

2. *quadrangularis*.

Calyx-lobes cuneate, retusely 2-lobed, the folds narrow ; leaves elliptic or orbicular, acute or obtuse, .5—75 in. in diam., hispid-pubescent ; fruit depressed-globose, .25 in. in diam.....3. *pubescens*.

1. *SAUROPUS ANDROGYNUS*, Merr. *S. albicans*, Bl. ; F. B. I. v. 332. *S. indicus*, Wt. Ic. t. 1952, fig. 2.

W. Gháts, from the Wynaad southwards, in evergreen forest, at 2,000—4,000 ft.

An erect shrub reaching 4 ft. in height.

2. *SAUROPUS QUADRANGULARIS*, Muell. Arg. ; F. B. I. v. 335, *Ceratogynum rhamnoides*, Wt. Ic. t. 1900 (not good).

N. Circars, in Vizagapatam and Godavari, on cultivated land (Roxb.), also in the hills; W. Gháts, in most Districts at low levels.

A small shrub, with many twiggy branchlets.

3. *SAUROPUS PUBESCENS*, Hook. f.; F. B. I. v. 335.

Hills of Vizagapatam, up to 4,000 ft. (A. W. Lushington, Barber).
A small shrub, similar to the last but pubescent. The branches are sometimes compressed and winged.

19. *Breynia*, Forst.

Shrubs or small trees. *Leaves* small, alternate, entire, petioled, often distichous. *Flowers* monoecious, minute, axillary. *Calyx* in ♂ turbinate or hemispheric, truncate, lobes 5—6, with the rounded glands of the tube behind them; in ♀ campanulate or rotate, 6-lobed, sometimes accrescent in fruit. *Petals* 0. *Disk* 0. *Stamens* 3, the filaments connate in a column, the cells linear parallel, distinct. *Ovary* globose or truncate or depressed at top, 3-celled; either styles 3 sessile or connate in a short column, or stigmas 3 sunk in the apex of the ovary. *Fruit* globose or depressed, more or less succulent, indehiscent or with a 6-valved pericarp enclosing cocci. *Seeds* with membranous testa; albumen fleshy; cotyledons broad; radicle long.

Calyx of ♀ enlarged in fruit, the fruit itself depressed-globose, orange, dehiscent, .5—75 in. in diam.; styles slender, bifid; leaves membranous, broadly elliptic, obtuse, .5—1 in. long.....1. *patens*.
Calyx of ♀ very little enlarged in fruit, the fruit globose, red, .25—5 in. in diam.; styles very short; leaves membranous, elliptic or ovate, obtuse or acute, up to 2 in. long, nearly 1 in. broad, but usually much smaller.....2. *rhamnoides*.

1. *BREYNIA PATENS*, Rolfe; F. B. I. v. 329. *Melanthesa turbinata*, Wt. Ic. t. 1897. *M. obliqua*, Wt. Ic. t. 1898, fig. 2.

Carnatic, hills of Chingleput, S. Arcot and Trichinopoly; W. Gháts, in dry forest localities at low levels up to 4,000 ft.
A shrub reaching about 4 ft. high.

2. *BREYNIA RHAMNOIDES*, Muell. Arg.; F. B. I. v. 330. *Melanthesa rhamnoides*, Wt. Ic. t. 1898, fig. 1.

N. Circars, Deccan and Carnatic, in deciduous forests, chiefly in open places; W. Gháts, Malabar and Travancore, less common.
A large shrub reaching 10 ft. in height, 20 ft. (Bourdillon).
Vern. *Tel.* Yellari; *Tam.* Manipulnati.

20. *Glochidion*, Forst.

Evergreen trees or shrubs. *Leaves* alternate, bifarious, entire, shortly petioled. *Flowers* small, monoecious or dioecious, in axillary clusters. *Calyx* in ♂ of 6 lobes, in 2 series, imbricate, spreading; in ♀ shortly tubular with 6 often unequal lobes. *Petals* 0. *Disk* 0. *Stamens* 3—8, connate by their connectives in a column, the connectives produced in usually free tips; anthers with linear cells, extrorse. *Ovary* 3—15-celled; ovules 2 in each cell; styles connate in a column lobed at the tip, the column sometimes short but usually gradually lengthening; pistillode in ♂ usually 0 or very small behind the anthers.

Fruit a capsule of 3 or more 2-valved cocci, globose or orbicular or depressed or intruded at the base and apex crowned by the often enlarged style; the cocci crustaceous or coriaceous, the epicarp separable or not. *Seeds* hemispheric or laterally compressed; testa crustaceous; albumen fleshy; cotyledons flat.

Anthers 4 or more:—

Style a broad shallow cone hollowed at the apex, pubescent at base without; leaves coriaceous, orbicular, obtuse, 2—3 in. in diam.....1. *littorale*.

Style conical, cleft at the tip; flowers in shortly peduncled umbels or fascicles; fruit globose, sometimes beaked; stipules falcate, acuminate:—

Leaves beneath and branches and inflorescence finely grey-pubescent; leaves elliptic or ovate-oblong, shortly acute at apex, unequal and often subcordate at base, up to 6 in. long, 3 in. broad, main nerves 6—8 pairs; style pubescent; capsules 2—3 in. long, conical, beaked.....2. *tormentosum*.

Leaves and branches and inflorescence glabrous; leaves ovate lanceolate or oblong, shortly acute at apex, unequal and rounded or cordate at base, up to 8 in. long, 3 in. broad, main nerves 8—12 pairs; style glabrous; capsules 3—4 in. long, often beaked, later depressed.....3. *zeylanicum*.

Anthers 3:—

Branchlets, inflorescence and leaves more or less pubescent:—

All parts prominently velvety pubescent; leaves elliptic ovate or lanceolate, obtuse or subacute, 2—5 in. long, 1—2 in. broad (larger in shoots), main nerves 6—8 pairs; stamen connective acute at apex; style cylindric, villous, 4—6-lobed; capsules 3—5 in. in diam., depressed, the seeds red.....4. *velutinum*.

Branchlets, inflorescence and leaf midribs tawny, crispate pubescent; leaves subcoriaceous, ovate, obtusely acuminate at apex, narrowed at base, with 5—6 very oblique prominent nerves, up to 4 in. long, 1.5 in. broad; style columnar, elongate; capsule 6-lobed, depressed at apex, crowned by the style-column.....5. *arboresum*.

Branchlets and inflorescence softly fulvous-tomentose, the leaves beneath sparsely pubescent; leaves oblong, obtuse or obtusely acuminate, 4—5 in. long, 1.25 in. broad, main nerves 6—8 pairs, arched; style short, depressed globose; capsule 6-lobed, smooth, .25 in. diam.....6. *johnstoni*.

Branchlets slender, fulvous-puberulous; leaves chartaceous, ovate or ovate-oblong, acuminate at apex, narrowed or obtuse and equal at base, glabrous, main nerves 6—8 pairs, up to 6.5 in. long, 2 in. broad; style thick, elongate and widening upwards with triangular lobes.....7. *siparense*.

Branchlets slender, sparsely puberulous; leaves chartaceous, lanceolate, acuminate, unequal at base, glabrous, reticulate; main nerves 8—10 pairs, up to 5 in. long, 1.5 in. broad; style thick, widening upwards; capsule glabrous, .5 in. broad, tipped by the slender columnar style.....8. *pauciflorum*.

Branchlets and leaves glabrous, sometimes the flowers only very slightly puberulous:—

Leaves chartaceous, elliptic or oblong, obtuse or acute, the base unequal, reticulate, main nerves 6—8 pairs, up to 4 in. long, 1—1.25 in. broad; style very stout, short, truncate; capsule .4 in. broad, tipped with the short thick style.....9. *neilgherrense*.

Leaves submembranous, ovate, ovate-lanceolate or ovate-oblong, obtuse or shortly acuminate, reticulate, main nerves 6—8 pairs, up to 4 in. long, 1.5 in. broad; style very short, widening at the lobes; capsule .4 in. broad, tipped with the short thick style.....10. *fagifolium*.

Leaves lanceolate or oblong-lanceolate, acuminate at both ends, rather unequal at base, up to 5 in. long, 1.5 in. broad; style conical.....11. *ellipticum*.

Leaves chartaceous, elliptic or elliptic-oblong, abruptly acuminate at apex, acute or obtuse at base, main nerves 7—10, prominent, up to 5 in. long, 2 in. broad; style very small, conical; capsule .3 in. in diam., depressed.....12. *malabaricum*.

Leaves ovate or obovate, shortly acute at apex, unequal at base, main nerves 5—6 pairs, reticulation prominent, up to 4 in. long, 1.5 in. broad; style columnar eventually.....13. *Bourdillonii*.

1. *GLOCHIDION LITTORALE*, Blume; F. B. I. v. 308.
W. Coast, Malabar (Beddome, Wight).
A small tree.
2. *GLOCHIDION TOMENTOSUM*, Dalz.; F. B. I. v. 309.
W. Gháts in S. Canara, Coorg, Mysore, more scarce in Malabar and Travancore, up to 4,000 ft., in grass land.
A small tree with rather large leaves and somewhat angular branchlets, the stipules generally erect.
3. *GLOCHIDION ZEYLANICUM*, A. Juss.; F. B. I. v. 310.
N. Circars, hills of Godavari; Carnatic, Kambakam Hills in Chingleput; W. Gháts, from Mysore southwards, in evergreen forests up to 3,000 ft., common along streams and in swampy places (Bourdillon).
A small tree, reaching 30 ft. in height, the flowers yellow, the capsules orange, the stipules reflexed. As also with *G. tomentosum*, the old leaves when dry are whitish above, almost bullate and very brittle. The variety *G. canaranum*, Miq. (Hohenacker), has rather smaller leaves and a round, prominently-beaked capsule.
4. *GLOCHIDION VELUTINUM*, Wt. Ic. t. 1907, fig. 2; F. B. I. v. 322.
N. Circars, Ganjam to Godavari, up to 4,500 ft. on Mahendragiri (Fischer and Gage); Carnatic, Shevaroy Hills of Salem (Perrottet); W. Gháts, Nilgiris, Anamalais, Pulneys and hills of Travancore, up to 6,000 ft.
A small tree. Bark brown, rough; wood red, hard, not used.
5. *GLOCHIDION ARBOREUM*, Wt. Ic. t. 1907, fig. 1; F. B. I. v. 316.
W. Gháts, Sivagiri Hills of Tinnevely.
A small tree, the inflorescence branchlets zigzag, the ♀ pedicels elongate in fruit.
6. *GLOCHIDION JOHNSTONEI*, Hook. f.; F. B. I. v. 314.
W. Coast and W. Gháts, in Cochin (Johnstone); Mysore, at 2,000 ft. (Meebold).
Apparently a small tree with long angular branchlets.
7. *GLOCHIDION SISPARENSE*, Gamble, n. comb. *G. arboreum*; Hook. f.; F. B. I. v. 316 in part, not of Wt.
W. Gháts, Sispara in Nilgiris at 5,000 ft. (Wight, Lawson, Gamble).
A tree with glabrous leaves and few and distant flowers, the lobed calyx pubescent.
8. *GLOCHIDION PAUCIFLORUM*, Gamble, n. comb. *G. arboreum* var. *pauciflorum*, Hook. f. in Hb. Kew.
W. Gháts, Sholas of the Nilgiri and Pulney Hills, about 5,000—7,000 ft.
A rather common tree, very near the last and also with few-flowered clusters, but with narrower more reticulate leaves and large capsule, the leaves nearly black when dry.
9. *GLOCHIDION NEILGHERRENSE*, Wt. Ic. ii. 29; F. B. I. v. 316; Bedd. Fl. t. 277.
W. Gháts, Nilgiri Hills above 5,000 ft. in Shola forests, common; hills of N. Coimbatore.

A moderate-sized tree with many-flowered clusters in zigzag branches, the leaves usually black when dry or the upper side greenish. Bark reddish-brown, thin, peeling off in flakes; wood red, moderately hard. Vern. *Badaga* Hanikay.

10. *GLOCHIDION FAGIFOLIUM*, Hook. f.; F. B. I. v. 312.

W. Ghâts, Nilgiris, in Shola forests on the downs about 7,000 ft. A tree, the thin leaves prominently reticulate and often greenish-brown when dry.

11. *GLOCHIDION ELLIPTICUM*, Wt. Ic. t. 1906; F. B. I. v. 321 *G. Hohenackeri*, Bedd.; F. B. I. v. 314.

W. Ghâts, all Districts, in evergreen forests, up to about 4,000 ft. A moderate-sized tree.

Var. *Ralphii*. *G. Ralphii*, Hook. f.; F. B. I. v. 314. Branchlets very slender; leaves smaller, scarcely 2·5 in. long, ·75 in. broad; flowers, especially ♀, very small. S. Tinnevely, at 3,500 ft. (Beddome).

12. *GLOCHIDION MALABARICUM*, Bedd.; F. B. I. v. 319.

W. Ghâts, Coorg to Travancore, at low levels; Pulney Hills (?) (Bourne).

A small tree, the leaves with prominent curved and arching nerves.

13. *GLOCHIDION BOURDILLONII*, Gamble in Kew Bull. 1925, 330. *G. rigidum*, Bourd. Trav. Trees 334.

W. Ghâts, evergreen forests at low levels up to 4,000 ft., in ravines and near streams (Bourdillon).

A small evergreen tree, the leaves reticulate.

21. *Aporosa*, Blume.

Trees. *Leaves* alternate, entire or rarely sinuate-toothed; stipules small. *Flowers* dioecious, ♂ minute, in axillary solitary or clustered catkin-like spikes, ♀ in short bracteate spikes. *Calyx*-lobes 3–6, usually 4, membranous, the ♀ larger than in ♂. *Petals* 0. *Stamens* 1–5, central; filaments capillary, anthers didymous. *Disk* 0. *Ovary* 2-, rarely 3-celled; ovules 2 in each cell; stigmas small, plumose, spreading and recurved; pistillode in ♂ minute or 0. *Fruit* an ellipsoid ovoid or globose capsule, opening irregularly or partially 2–4-valved; epicarp thin or thick and spongy or fleshy, endocarp thin, often separable; cells glabrous or hairy within. *Seeds* oblong or suborbicular, usually plano-convex; albumen fleshy; cotyledons broad, flat.

Capsule smooth or rugose when dry, glabrous or hairy:—

Capsule glabrous:—

Capsule globose, pedicelled, ·4 in. in diam.; ♂ catkins up to 2 in. long; leaves elliptic-oblong, acuminate, rounded or acute at base, up to 7 in. long, 3 in. broad.

1. *Lindleyana*.

Capsule fusiform, beaked, up to ·75 in. long, ♂ catkins stout, up to 1 in. long; leaves obovate or orbicular, obtuse or retuse, cuneate at base, up to 5 in. long, 3 in. broad.

2. *fusiformis*.

Capsule sparsely villous, ovoid, ·5 in. long; ♂ catkins very short scarcely ·5 in. long; leaves lanceolate, caudate acuminate, acute at base, up to 4 in. long, 1·5 in. broad.

3. *acuminata*.

Capsule ovoid, covered with long soft processes and rugose, beaked, up to 1 in. long; ♂ catkins ·75 in. long, prominently bracteate; leaves oblong, long and often caudately acuminate, rounded at base, pubescent on the nerves, up to 6 in. long, 2 in. broad.

4. *Bourdillonii*.

1. *APOROSA LINDLEYANA*, Baill ; F. B. I. v. 349 ; Bedd. Fl. t. 286. *Scepa Lindleyana*, Wt. Ic. t. 361.
W. Gháts, from S. Canara and Mysore to Annamalais and Travancore Hills, in ever green forests up to 3,000 ft.
A small or medium-sized evergreen tree with coriaceous leaves. Bark brown, smooth ; wood brown, rough, said to be useful. Vern. *Kan.* Sulla, sali ; *Tam.* Vittil ; *Mal.* Vetti.
2. *APOROSA FUSIFORMIS*, Thw. ; F. B. I. v. 351.
W. Gháts, hills of Travancore, in evergreen forest at 2,000—3,000 ft. (Bourdillon).
A small tree with very coriaceous leaves in Ceylon, rather less so in Madras.
3. *APOROSA ACUMINATA*, Thw. ; F. B. I. v. 348.
W. Gháts, Anamalais and hills of Travancore, in evergreen forests up to 3,000 ft.
A small tree, sometimes a shrub.
4. *APOROSA BOURDILLONII*, Stapf in Hook. Ic. t. 2204.
W. Gháts, evergreen forests of N. Travancore at low levels (Bourdillon).
A small tree, reaching 25 ft. in height.

22. *Baccaurea*, Lour.

Trees. *Leaves* alternate, entire or rarely crenate-serrate, penninerved, stipules caducous. *Flowers* dioecious, rarely monoecious, in simple or compound spikes or racemes. *Calyx*-lobes, 4—5, usually unequal, imbricate. *Petals* 0. *Stamens* 4—8 ; filaments short, free ; anthers small, didymous. *Disk* 0. *Ovary* ovoid or globose, 2—5-celled ; ovules 2 in each cell ; stigmas 2—5, small, sessile, free or connate in a short style ; pistillode in ♂ flowers pubescent, orbicular, sessile or stipitate. *Fruit* an ovoid globose obovoid or fusiform 2—4-celled capsule, late dehiscent ; pericarp thick or thin, coriaceous, crustaceous, or woody. *Seeds* broad, compressed ; testa with a thick aril-like covering ; albumen hard or fleshy ; cotyledons flat.

BACCAUREA COURTALENSIS, Muell. Arg. ; F. B. I. v. 367. *B. sapida*, Bedd. Fl. t. 280. *Pierardia macrostachys*, Wt. Ic. tt. 1912, 1913.

W. Gháts, from S. Canara southwards, in evergreen forest, up to 3,000 ft.

An evergreen tree remarkable for the flowers growing in long racemose spikes, in tufts on tubercles on the stems and branches, often "in great profusion, the whole trunk appearing as a crimson mass (Bedd.)." *Leaves* oblanceolate, acuminate, up to 7 in. long, 3 in. broad. *Fruit* crimson, about 1 in. in diam., edible. *Bark* pale brown, rough ; *wood* yellowish-white. Vern. *Kan.* Koli kuki ; *Mal.* Mutta Thuri.

23. *Daphniphyllum*, Blume.

Trees, branches stout, the leaves near the tops. *Leaves* alternate, entire, long-petioled, usually glaucous beneath. *Flowers* dioecious, sometimes monoecious in axillary racemes. *Calyx*-lobes 3—8, small. *Petals* 0.

Stamens 5—12, free; anthers large, the cells parallel, dehiscing laterally, connective apiculate. *Disk* 0. *Ovary* imperfectly 2-celled; ovules 2 in each cell; stigmas thick, recurved, undivided; pistillode in ♂ 0. *Fruit* an ovoid or oblong drupe, the pericarp woody. *Seed* solitary; testa membranous; albumen copious fleshy; embryo small, the cotyledons narrow.

DAPHNIPHYLLUM NEILGHERRENSE, Rosenth. *D. glaucescens*, Muell. Arg., not of Bl.; F. B. I. v. 353. *D. Roxburghii*, Baill.; Bedd. Fl. t. 288. *Goughia neilgherrensis*, Wt. Ic. tt. 1878, 1879.

W. Ghâts, Shola forests of the Nilgiris and southwards, above 5,000 ft.; Bababudan Hills of Mysore.

A medium-sized evergreen tree with elliptic or obovate-oblong obtuse leaves, usually glaucous beneath, reaching 5 in. by 3 in., the petioles 2 in., the drupe 5 in. long, greenish-red. Bark brown, somewhat corky; wood grey, even-grained, only used as fuel. Vern. *Badaga* Nir kocki; Nir chappay.

24. *Putranjiva*, Wall.

Trees. *Leaves* alternate, evergreen, entire or serrulate, reticulate. *Flowers* monoecious or dioecious, axillary ♂ in clusters, ♀ subsolitary. *Calyx-lobes* 3—6, imbricate. *Petals* 0. *Stamens* 2—4 in the centre of the flower, filaments free or connate; anthers erect, the cells parallel. *Disk* 0. *Ovary* ovoid, 2—3-celled; ovules 2 in each cell; styles 2—3, spreading, dilated into broad fleshy stigmas. *Fruit* an ovoid or globose drupe with hard endocarp. *Seed* solitary, ovoid; testa crustaceous; albumen fleshy; cotyledons obovate, cordate, flat.

PUTRANJIVA ROXBURGHII, Wall.: F. B. I. v. 336; Wt. Ic. t. 1876; Bedd. Fl. t. 275; Brand. For. Fl. t. 53.

N. Circars, Deccan and Carnatic, also in suitable places in Malabar, usually on river banks and in shady valleys, up to about 2,000 ft. A moderate-sized evergreen tree with coriaceous, elliptic-oblong, serrulate leaves up to 4 in. long, 1.5 in. broad. Bark dark grey with horizontal lenticels; wood grey, moderately hard, close-grained, useful for small purposes. The nuts are strung in necklaces and rosaries. Vern. *Hind.* Jia puta, putranjiva; *Ur.* Paishandia; *Tel.* Kadrajuvi; *Tam.* Karupala.

25. *Mischodon*, Thw.

Tree. *Leaves* whorled, coriaceous, entire, penninerved. *Flowers* dioecious, in axillary panicles, the ♀ elongating in fruit. *Calyx-lobes* 5—8, usually 6, imbricate, often unequal. *Stamens* usually 6, exserted, the filaments free, villous, as are the anthers, which dehisce longitudinally. *Disk* in ♂ 0, in ♀ annular. *Ovary* 3—4-celled; ovules 2 in each cell; stigmas 3—4, large, sessile, flat; pistillode in ♂ 3-lobed. *Fruit* a capsule of 3 2-valved cocci. *Seeds* 1—2 in each coccus, testa crustaceous, shining; albumen fleshy; cotyledons broad, flat.

MISCHODON ZEYLANICUS, Thw.; F. B. I. v. 344; Bedd. Fl. r. 290.

W. Ghâts, Anamalai Hills (Beddome), hills of Tinnevely; common in Ceylon.

A large tree with bluntly tetragonous branchlets, and linear-oblong leaves reaching 8 in. long and 2·5 in. broad, but usually narrower, the young ones bright red. The capsules are large, 75 in. in diam. Trimen says the timber is excellent. Vern. *Tam.* Tampanai.

26. *Bischofia*, Blume.

Large tree. *Leaves* alternate, 3-foliolate, often crenate. *Flowers* dioecious, minute, in axillary or lateral paniced racemes; ♂ scattered or clustered, ♀ scattered longer-pedicellate. *Calyx*-lobes 5, ♀ concave, obtuse, enclosing the anthers but later reflexed, ♀ ovate, caducous. *Petals* 0. *Stamens* 5, filaments short, anthers large with parallel cells; staminodes in ♀ small or 0. *Disk* 0. *Ovary* 3—4-celled; ovules 2 in each cell; styles long, linear, stigmatic on the inner face; pistillode in ♂ a flat disk on short stalk. *Fruit* a globose fleshy berry with 3—4-cells lined with a parchment-like 2-valved endocarp. *Seeds* oblong-trigonus; testa crustaceous; albumen fleshy; cotyledons flat, ovate.

BISCHOFIA JAVANICA, Bl.; F. B. I. v. 344; Bedd. Fl. t. 259. *Microchus Roeperianus* W. & A.; Wt. Ic. t. 1880.

N. Circars, Deccan and Carnatic, in hilly country, in ravines up to 4,000 ft., W. Gháts, in evergreen forests, in all Districts.

A large deciduous tree, the large leaflets elliptic-ovate crenate up to 5 in. long. Bark rough, brown; wood red, smooth, moderately hard, useful for planking and other purposes. Vern. *Hind.* Kein; *Tam.* Thondi, Milachityan; *Mal.* Thirippu, nira.

27. *Croton*, Linn.

Trees or shrubs, rarely herbs. *Leaves* alternate, rarely opposite or whorled, usually 2-glandular at the base; stipules linear. *Flowers* usually monoecious, solitary or clustered on the rhachis of a terminal raceme; bracts small. *Calyx* 5- (rarely 4- or 6-) partite, the lobes imbricate or valvate. *Petals* 5 (rarely 4 or 6), in ♂ usually smaller than the calyx-lobes, in ♀ very small or 0. *Disk* annular or of glands opposite the calyx-lobes. *Stamens* many, inserted on the villous receptacle; filaments free, inflexed in bud, then erect; anther-cells parallel. *Ovary* 3- (rarely 2—4-) celled; ovule solitary in each cell; styles long, 2—4-cleft, slender; pistillode in ♂ 0. *Fruit* a capsule 3-valved or of 3 deciduous 2-valved cocci. *Seeds* 3, smooth, carunculate; testa crustaceous; albumen copious; cotyledons flat.

Ovary covered with stellate scales or tomentum:—

Inflorescence scaly:—

Leaves covered on under-surface, often also above, with stellate silvery or yellowish scales:—

Leaves entire:—

Leaves elliptic-, ovate-, or linear-lanceolate, long-acuminate, shortly triple-ribbed, up to 8 in. long, 2·5 in. broad; petiole up to 1·5 in. long; stamens many, filaments glabrous; capsule 5 in. long.....1. *reticulatus*.

Leaves ovate or rhombic-ovate, acuminate, cuneate at base; up to 6 in. long, 3 in. broad, petiole to 5 in. long; stamens 10—12, filaments villous; capsule about 1 in. long.....2. *malabaricus*.

Leaves crenate, ovate or orbicular, obtuse or slightly acute, cordate at base, tawny or silvery scaly on both surfaces, 3—5 ribbed, up to 4·5 in. long, 3 in. broad, petiole up to 1 in.; stamens 10—12, filaments glabrous; capsule to 5 in. long.....3. *scabrosus*.

Leaves glabrous when old, scaly when quite young, oblong-lanceolate, acute, narrowed at base, crenate-serrate, up to 10 in. long, 3.5 in. broad, petiole to 2 in.; stamens 12, filaments villous below; capsule about .25 in. long.

4. *oblongifolius*.

Inflorescence stellate-tomentose; leaves 3—5-ribbed at base, base and margin with stalked glands:—

Capsule under .5 in. long, subglobose:—

Leaves membranous, broadly ovate or orbicular, cordate, crenulate and glandular, nearly glabrous, but scaly on the nerves beneath, up to 4.5 in. long, 3 in. broad, petiole to 6.5 in., tawny-tomentose, racemes slender, the flowers mostly solitary, stamens about 30.....5. *aromaticus*.

Leaves chartaceous, ovate or lanceolate, acuminate, rounded at base, subentire, fulvous stellate-tomentose beneath, up to 6 in. long, 2.5 in. broad, petiole to 2 in.; racemes elongate, stamens about 20.....6. *lacciferus*.

Capsule .75—1 in. long, globose or oblong; leaves ovate or orbicular cordate, acute or acuminate, irregularly crenate-serrate, scabrous above, stellate-tomentose beneath, up to about 4 in. diam.; racemes slender, flowers in fascicles.

7. *caudatus*.

Inflorescence glabrous or nearly so; leaves 3—5-ribbed at base:—

Side ribs of leaves inconspicuous; leaves membranous, elliptic-ovate or oblong, acute, stellate-hairy only when quite young, entire or serrulate, up to 3.5 in. long, 1.5 in. broad, petiole to 1 in.; racemes slender, to 3 in. long; capsule .25 in. in diam., nearly glabrous, smooth.....8. *Klotzschianus*.

Side ribs of leaves prominent; leaves membranous, ovate, acuminate serrate, glabrous, up to 6 in. long, 3 in. broad, petiole to 2 in.; racemes 3 in. long; capsule .75—1 in., obovoid, smooth.....*Tiglitum*.

Ovary glabrous; sepals much enlarged in fruit; leaves chartaceous, prominently 3—5-ribbed at base, ovate, long-acuminate, glabrous when old, up to 5 in. long, 2 in. broad; racemes short; capsule .7 in. in diam., rugose, glabrous.

9. *Lawianus*.

1. *CROTON RETICULATUS*, Heyne; F. B. I. v. 386; Bedd. Ic. t. 233.
W. Gháts, S. Canara to the Anamalais and Travancore and Tinnevely Hills, in evergreen forests at 3,000—5,000 ft.
A shrub or small tree, the leaves with stalked glands at their base. Vern. *Mar.* Panduray.
2. *CROTON MALABARICUS*, Bedd. Ic. t. 181; F. B. I. v. 386.
W. Gháts in all Western Districts, in evergreen forests at 3,000—4,000 ft.
A medium-sized tree reaching 30 or even 60 ft. in height, the glands sessile, obscure. Vern. *Tam.* Thavatta polavu; *Mal.* Kóla Vacchi.
3. *CROTON SCABIOSUS*, Bedd. Fl. t. 283; F. B. I. v. 386.
Deccan, on dry stony hills in Cuddapah and Kurnool at 1,000—4,000 ft.
A small, often gregarious tree, the leaf-glands sessile. Bark dark brown, rough; wood yellowish white, hard and close-grained. Vern. *Tel.* Yerri chillā.
4. *CROTON OBLONGIFOLIUS*, Roxb.; F. B. I. v. 386.
N. Circars and Deccan, very scarce; W. Gháts, S. Canara to Nilgiris, in rather dry forests, not common, but usually in scrub near villages.
A small or medium-sized, deciduous, often gregarious tree, the leaves turning red before falling. Bark grey or brownish; wood yellowish white, moderately hard. Vern. *Tel.* Bhutankusam; *Tam.* Millakumari.

5. *CROTON AROMATICUS*, Linn.; F. B. I. v. 338 *in part*.
Carnatic? (Wight)—Mission Garden, Tranquebar (Wall. Cat. 7773c). A shrub with thin leaves, the capsule 3 in. in diam., glabrous except for scabrid hairs.
6. *CROTON LACCIFERUS*, Linn.; Wt. Ic. t. 1915. *C. aromaticus*, Linn.; F. B. I. v. 338 *in part*.
W. Gháts, in rather dry open and Shola forests of the Nilgiris, Anamalais and hills of Travancore and Tinnevely, usually at 4,000—7,000 ft., sometimes lower; Kollimalai Hills of Trichinopoly; Babubudan Hills of Mysore.
A shrub or small tree, slightly aromatic, the leaves turning red before falling, the capsule very scabrid, 4—5 in. in diam. Vern. *Tam. Teppaddi*.
7. *CROTON CAUDATUS*, Geisel; F. B. I. v. 388.
W. Gháts, Wynaad, Anamalais and hills of S. Travancore, up to 3,000 ft., scarce and usually near streams.
A subscandent shrub with long branchlets and large thick-shelled capsules.
8. *CROTON KLOTZSCHIANUS*, Thw.; F. B. I. v. 392. *Tigilium Klotzschianum*, Wt. Ic. t. 1914.
Carnatic, Kambakam Hills of Chingleput; Deccan, hills of Cuddapah and Kurnool, in dry evergreen forest; W. Gháts, hills of Tinnevely at 1,000—3,000 ft. on E. side.
A shrub or small tree, most usually straggling among other bushes.
9. *CROTON LAWIANUS*, Nimmo; F. B. I. v. 394.
Babubudan Hills of Mysore (Law).
A small tree with slender branches.

C. Tigilium, Linn. (Vern. *Hind. Jaipal*; *Tam. Nirvalam*) is a North Indian small tree, frequently found in cultivation in the Madras plains. It is the source of the powerful medicine Croton oil. *C. sparsiflorus*, Morong, is an introduced American weed, which, having first arrived in Bengal (Burkill in 'As. Soc. Pro.', 1910), has now wandered south along the Coromandel Coast even to Tinnevely (Rangachari).

28. *Chrozophora*, Neck.

Coarse herbs, less often undershrubs, usually clothed with stellate tomentum. *Leaves* alternate, petioled, sinuate-toothed or -lobed, plicate, rugose or bullate or nearly flat, often biglandular at the apex of the petiole. *Flowers* monoecious, in short dense racemes in the upper leaf-axils, the ♂ crowded near the top, subsessile, the ♀ below, pedicelled. *Calyx* 5-lobed, in the ♂ closed in bud, afterwards spreading, in the ♀ much narrower, nearly setaceous. *Petals* 5, alternate with and like the calyx-lobes, but smaller. *Disk* of 5 glands alternate with the petals. *Stamens* 5—15, the filaments connate, at least below, in a column; anther-cells oblong, parallel. *Ovary* 3-celled; ovule 1 in each cell; styles 3, each bifid; pistillode in ♂ 0. *Fruit* a 3-lobed capsule of 3 hispid tomentose or scaly 2-valved cocci. *Seeds* without caruncle, globose; testa shining; albumen fleshy; cotyledons flat.

Stems prostrate; racemes short; capsules 1—2 in. in diam., nearly black with grey stellate tomentum, not tinctorial:—

Leaves not glandular at base, ovate or suborbicular, 5—1 in. in diam., usually strongly wrinkled and bullate, the large stellate hairs stalked; anthers short, under 1 in. long.....1. *prostrata*.
Leaves 2-glandular at base, ovate or lanceolate, 1 to nearly 2 in. long, only slightly bullate, the stellate hairs sessile; anthers longer, about 1 in. long.

2. *parvifolia*.

Stems erect; racemes elongate; capsules 3 in. in diam., reddish, with dense stellate tomentum, tinctorial when wetted; leaves broadly ovate-orbicular, 3-lobed, undulate crenate, with sessile stellate hairs, 2—4 in. in diam., petiole to 2 in.; anthers over 1 in. long.....3. *Rotleri*.

1. *CHROZOPHORA PROSTRATA*, Dalz.; Prain in Kew Bull. 1918, 90. *C. plicata* 3; F. B. I. v. 410.

N. Circars and Carnatic in damp places as on the edge of rivers and tanks and dried-up irrigated fields.

An annual herb with prostrate branches, yellow petals, orange stigmas and capsules not giving a colour when wetted.

2. *CHROZOPHORA PARVIFOLIA*, Klotzsch; Prain l.c. 91. *C. plicata* 2; F. B. I. v. 410.

N. Circars, banks of the Godavari (Barber); Carnatic, near Madras; Deccan, in Anantapur (Gamble).

A prostrate herb with rather thin leaves.

3. *CHROZOPHORA ROTTLEI*, Klotzsch; Prain l.c. 95. *C. plicata* 1; F. B. I. v. 410.

N. Circars, Deccan and Carnatic, West to the E. slopes of the Ghâts, in dry places, and on road-sides.

An erect herb or undershrub with large leaves, yellow petals and red stigmas, the capsules giving a blue colour when wetted.

29. *Agrostistachys*, Dalz.

Shrubs or small trees. *Leaves* alternate, entire or serrate, pinninerved. *Flowers* dioecious, in axillary or supra-axillary bracteate racemes or spikes, ♂ solitary or clustered within the bract, ♀ solitary. *Calyx* globose, splitting into 2—5 valvate lobes. *Petals* usually 5, shorter than the calyx-lobes in ♂, longer in ♀ but caducous. *Disk* large, of 5 glands alternate with the petals. *Stamens* 8—13 on a convex receptacle, filaments nearly free; anthers versatile, the cells pendulous from a thickened connective. *Ovary* 3-celled; ovule 1 in each cell; styles short, thick, spreading; pistillode in ♂ usually large. *Fruit* a capsule, of 3 2-valved cocci. *Seeds* globose; testa crustaceous; albumen fleshy; cotyledons flat.

Leaves strongly serrate, elliptic-oblong or lanceolate, acute at both ends, up to 15 in. long, 4 in. broad; ♂ racemes small, catkin-like, in axillary clusters; ♀ flowers solitary; stamens clustered within the disk.....1. *indica*.
Leaves entire, oblanceolate, very coriaceous, up to 15 in. long; flowers in elongate spiciform racemes; stamens 10, 5 within the disk, 5 outside it; capsule 5 in. broad.....2. *Meeboldii*.

1. *ACROSTISTACHIYS INDICA*, Dalz.; F. B. I. v. 406; Bedd. Ic. t. 241.

W. Ghâts, in evergreen forests in all districts, up to 6,000 ft., usually on the banks of streams.

A shrub or small tree.

2. *AGROSTISTACHYS MEEBOLDII*, Pax and K. Hoffm., in Engl. Pflzreich. iv. 147, vi. 100. *A. longifolia*, Benth.; F. B. I. v. 407 in part. *Sarcoclinium longifolium*, Wt. Ic. tt. 1887, 1888.

W. Ghâts, in Wynaad, Anamalais and hills of Travancore and Tinnevely, in evergreen forest at 2,000—5,000 ft.

A small tree with large thick leaves. Bark thin, dark; wood pale brown, moderately hard, not durable. Vern. *Tam.* Man charei; *Mal.* Mulimpala.

30. *Aleurites*, Forst.

Trees, often stellately pubescent or lepidote. *Leaves* alternate, long-petioled, entire or lobed, digitately 3—7-nerved at the base; petiole 2-glandular at apex. *Flowers* monoecious or subdioecious, in lax terminal paniced cymes. *Calyx* subglobose in bud, bursting irregularly into 2—3 valvate lobes. *Petals* 5, elongate and conspicuous. *Stamens* many, on a conical receptacle, the outer 5 alternating with the small disk-glands; filaments free; anthers erect, adnate, the cells parallel. *Disk* of 5 small glands, obscure in ♀. *Ovary* 2—5-celled; ovule solitary in each cell; styles with 2 stout linear arms. *Fruit* a large drupe with a hard, 1—5-celled stone. *Seed* with a thick woody testa; albumen thick, hard; cotyledons broad, flat.

ALEURITES MOLUCCANA, Willd.; F. B. I. v. 384; Bedd. Fl. t. 276.

Introduced from Malaya, now found run wild in some places, especially the Wynaad; often planted. Belgaum Walnut. A handsome tree with large long-petioled leaves of various shapes, chiefly deltoid or rhomboid and often 3—7-lobed. The flowers are in large tomentose cymes with white petals and the drupe is fleshy, ovoid, pointed, giving edible kernels full of a drying oil.

31. *Trewia*, Linn.

Trees. *Leaves* opposite, entire, broadly ovate or orbicular; 3—5-ribbed at base. *Flowers* dioecious, appearing before the leaves, ♂ in drooping racemes, ♀ long-peduncled, solitary or racemose. *Calyx* in ♂ globose in bud, then splitting into 3—4 concave, often reflexed, imbricate lobes; in ♀ of 3—5 imbricate caducous lobes. *Petals* 0. *Disk* 0. *Ovary* 2—4-celled; ovule 1 in each cell; styles 3—5, connate below, very long, papillose. *Fruit* a 2—4-celled drupe, indehiscent or sometimes dehiscent, with usually fleshy pericarp and crustaceous endocarp. *Seeds* ovoid; testa hard; albumen fleshy; cotyledons broad, flat.

End branchlets usually cottony-tomentose; leaves cordate at base, rarely truncate; racemes in ♂ long, in ♀ with few flowers, usually 1 only; drupe with thick pericarp, indehiscent 1—1.5 in. in diam. 1. *nudiflora*. End branchlets usually glabrous; leaves truncate at base, rarely slightly cordate, sometimes slightly cuneate; racemes in ♂ short, in ♀ many-flowered; drupe with thin loculicidally dehiscing pericarp, about .5 in. in diam. 2. *polycarpa*.

1. *TREWIA NUDIFLORA*, Linn.; F. B. I. v. 423; Wt. Ic. t. 1870 ♂.

N. Circars, up to 3,000 ft. in the hills, and chiefly in wet places and along streams, rare elsewhere, and perhaps usually only cultivated.

A deciduous tree with large leaves rather like those of *Gmelina arborea*. Bark smooth, grey; wood white, soft, used for drums and for the carved images in Roman Catholic Churches (Bourdillon). Vern. *Hind.* Gambhar; *Ur.* Mondu.

2. *TREWIA POLYCARPA*, Benth.; F. B. I. v. 424. *T. nudiflora*, Wt. Ic. t. 1871 ♀; Bedd. Fl. t. 281.

W. Coast and W. Ghâts, in Malabar and Travancore, at low levels, in wet places and along streams.

A tree reaching 50 ft. in height, with white wood, used as that of the former species. Vern. *Tam.* Ana thuvarci; *Mal.* Pambara Kumbil.

32. *Mallotus*, Lour.

Trees or shrubs. *Leaves* opposite or alternate, entire toothed or lobed, 3–7-ribbed or penninerved, sometimes peltate, often gland-dotted beneath, sometimes with glandular areas near the base above; stipules often present. *Flowers* dioecious or monoecious, in axillary or terminal simple or branched spikes or racemes, bracteate. *Calyx* in ♂ at first globose or ovoid, later separating into 3–5 valvate lobes; in ♀ spathaceous or valvately 3–5-lobed. *Petals* 0. *Disk* 0. *Stamens* 20–30 or more, central filaments free; anthers parallel, separated by a wide connective. *Ovary* 2–4-celled; ovule 1 in each cell; styles free or connate below, above spreading and plumose or papillose; pistillode in ♂ 0. *Fruit* a capsule of 2–3 cocci, each 2-valved, smooth, tubercled or echinate with hard or soft spines, usually very glandular. *Seed* ovoid or globose; testa crustaceous; albumen fleshy; cotyledons flat.

Leaves nearly or quite as broad as long, usually deltoid, ribbed from the base:—

Climbing or straggling shrub; leaves broadly deltoid-ovate, entire or sinuate, 3-ribbed, about 3 in. long, softly stellate-pubescent and glandular; capsules 2-valved, fulvous-tomentose, .5 in. in diam.; seeds black.....1. *repandus*. Tree with thick grey or tawny tomentose branches; leaves narrowly (broadly when young) peltate, broadly ovate, orbicular or deltoid, entire or shortly lobed, 3–5-ribbed, up to 10 in. in diam., densely white or fulvous stellate-tomentose; capsules 3–4-valved, .5 in. in diam., echinate with soft woolly spines and fulvous-tomentose; seeds black.....2. *albus*.

Leaves longer than broad:—

Leaves 3-ribbed at the base, very narrowly or not peltate:—

Leaves opposite, the petioles of the pairs unequal in length, ovate, acuminate, reticulate, entire or slightly sinuate, up to 10 in. long, 5 in. broad, pale when dry, and not glandular beneath; capsule 3-valved, .5 in. in diam., fulvous stellate-tomentose; seeds brown.....3. *distans*.

Leaves opposite and alternate, ovate-oblong or lanceolate, acute, the transverse nervules prominent, entire or slightly sinuate, up to 7 in. long, 2.5 in. broad, brown when dry, and yellow-glandular beneath; capsule 3-valved, .3 in. in diam., minutely pale brown stellate tomentose; seeds brown.....4. *rharnifolius*.

Leaves alternate, ovate or ovate-lanceolate, acuminate, the transverse nervules prominent, entire or shortly serrate, up to 8 in. long, 4.5 in. broad, greyish-pubescent to fulvous tomentose and red-glandular beneath; capsule 3-valved, .5 in. in diam., conspicuously red-glandular; seeds black.....5. *philippinensis*.

Leaves penninerved, or with sometimes a short opposite pair at the base:—

Leaves opposite or alternate, the lowest pair of nerves opposite and short, elliptic obovate or oblanceolate, acute, cuneate at base, entire or distantly dentate, glabrous, up to 7 in. long, 2 in. broad; flowers in slender racemes

6. *atrovirens*.

Leaves opposite, without a short opposite lowest pair of nerves:—

Capsules when mature with hard conical spines:—

Capsules .3 in. in diam., prominently yellow-glandular with few scattered spines; style-column elongate; leaves variable, elliptic-ovate or lanceolate, usually narrowed at both ends, up to 6 in. long, 2 in. broad, entire or sinuate.....7. *stenanthus*.

Capsules .5 in. in diam., sparsely yellow-glandular with many regular spines roughly in lines on the back; style-column very short or 0; leaves rhombic-lanceolate or -oblanceolate, narrowed at both ends, up to 5 in. long, 1.5 in. broad, entire or sinuate-dentate.....8. *muricatus*.

Capsules .5 in. in diam., the cocci somewhat elongate, minutely pubescent and with spines short when mature, elongate and soft when young; style-column short; leaves lanceolate or oblanceolate, long, but bluntly acuminate, reticulate, up to 7 in. long, 2 in. broad, widely sinuate-dentate.....9. *aureo-punctatus*.

Capsules when mature with subulate soft villous processes; leaves elliptic or slightly obovate, long and obtusely caudate-acuminate at apex, slightly attenuate at base, undulate, with prominent nerves and transverse nervules, up to 9 in. long, 3.5 in. broad.....10. *Beddomei*.

1. *MALLOTUS REPANDUS*, Muell. Arg.; F. B. I. v. 442.

N. Circars, Deccan and Carnatic to S. Travancore, at low levels, often in hedges and scrub forests and near the coast.

A large shrub, the trunk with long thorns, the ♂ flowers in panicles, the ♀ in racemes. Vern. *Hind.* Akús; *Tel.* Kanda velu.

2. *MALLOTUS ALBUS*, Muell. Arg.; F. B. I. v. 429. *Rottlera peltata*, Wt. Ic. t. 1873.

Var. *occidentalis*, Hook. f.

W. Gháts, in all Districts, in evergreen and secondary forest up to 4,000 ft.; Shévaroy Hills of Salem; Kollimalai Hills of Trichinopoly.

A moderate-sized tree, the flowers in panicles. Bark thin, grey; wood white and soft, of no value. Vern. *Tam.* Mullu polavú; *Mal.* Vatta kumbil.

3. *MALLOTUS DISTANS*, Muell. Arg.; F. B. I. v. 441; Bedd. Ic. t. 232.

W. Gháts, Anamalais and hills of Tinnevely about Courtallum.

A straggling shrub, the flowers in usually distant fascicles.

4. *MALLOTUS RHAMNIFOLIUS*, Muell. Arg.; F. B. I. v. 440.

W. Gháts, hills of Tinnevely and Travancore.

A shrub or small tree, resembling the next in leaf but at once distinguished by the capsule with nearly separate cocci and not red.

5. *MALLOTUS PHILIPPINENSIS*, Muell. Arg.; F. B. I. v. 442; Bedd. Fl.

t. 289. *Rottlera tinctoria*, Roxb. Cor. Pl. t. 168.

All Forest Districts in N. Circars, Deccan and W. Gháts, also in hills of Carnatic, up to 5,000 ft., common, especially in deciduous forest and open scrub lands.

A small tree, much branching low down. Bark grey; wood grey to light red, smooth and close-grained, a good fuel. The chief product is the red powder (Kamela) on the capsules which affords a bright orange dye. Vern. *Hind.* Raini; *Ur.* Sinduri; *Tel.* Kuunkuma; *Tam.* Kapli; *Mal.* Manjana.

Var. *tomentosus*. Leaves beneath densely fulvous-tomentose, acute to cuspidate-acuminate.

- W. Deccan, hills of Bellary and N. Coimbatore to N. and E. slopes of Nilgiris, common on the Coonoor Ghát up to 6,000 ft., also in Pulneys.
6. *MALLOTUS ATROVIRENS*, Hook. f.; F. B. I. v. 440.
W. Gháts, forests of Cochin and Travancore, at low levels; Anamalais (Beddome).
A shrub (?) the capsules unknown.
7. *MALLOTUS STENANTHUS*, Muell. Arg.; F. B. I. v. 437.
W. Gháts, Anamalais and hills of Travancore and Tinnevely.
A small tree with rough branches and usually flattened branchlets, the leaves narrower and more acuminate at both ends than in Bombay specimens.
8. *MALLOTUS MURICATUS*, Bedd.; F. B. I. v. 436. *Claoxylum muricatum*, Wt. Ic. t. 1886.
Deccan, Horsleykonda in Chittoor, at 3,500 ft. (Fischer); Carnatic, Kollimalai Hills of Trichinopoly (Rangachari); W. Gháts, Anamalais and hills of Travancore and Tinnevely.
A tree with much compressed branchlets and leaves very variable in shape but more or less rhombic.
9. *MALLOTUS AUREO-PUNCTATUS*, Muell. Arg. *M. Lawii*, Hook. f.; F. B. I. v. 438 in part.
W. Gháts, in Cochin (Johnson), Rookwood Estate, Travancore, at 2,000 ft. (Lawson), hills of Tinnevely.
A small tree (Lawson).
10. *MALLOTUS BEDDOMEI*, Hook. f.; F. B. I. v. 438.
W. Gháts, Wynaad, Anamalais and hills of Travancore and Tinnevely, up to 5,000 ft.; Bolampatti Hills of Coimbatore at 4,300 ft. (Fischer).
A shrub (Meebold) with large leaves.

33. *Symphyllia*, Baill.

Trees. *Leaves* alternate, entire or toothed; stipules 2. *Flowers* monoecious, in terminal or axillary spiciform racemes, the ♂ very numerous, clustered, the ♀ few, at the base only. *Calyx* in ♂ at first globular, then breaking into 4–6 valvate lobes; in ♀ of 5–8 unequal linear lobes. *Petals* 0. *Disk* 0. *Stamens* as many as the calyx-lobes, exserted; filaments at first inflexed; anthers dorsifixed, the cells parallel, often glandular at base. *Ovary* 3-celled; ovule 1 in each cell; styles connate below, spreading and bifid above and again divided in plumose arms; pistillode in ♂ columnar. *Fruit* a 3-lobed capsule. *Seeds* globose; testa crustaceous; albumen fleshy; cotyledons flat.

SYMPHYLLIA MALLOTIFORMIS, Muell. Arg. *Adenochlaena indica*, Hook. f.; F. B. I. v. 418. *Cephalocroton indicum*, Bedd. Fl. t. 261.
Deccan, hills of Cuddapah, along streams at about 3,000 ft. (Fischer); W. Gháts, from S. Canara and Coorg to Nilgiris, Anamalais and the hills of Travancore and Tinnevely, in ever-green forests, about 3,500 ft.

A tree with elliptic coriaceous shining entire leaves up to 7 in. long, 3.5 in. broad, very small flowers in close spikes and a grey capsule .75 in. in diam.

34. *Coelodepas*, Hassk.

Trees. *Leaves* alternate, oblong, entire or toothed, penninerved. *Flowers* monoecious or dioecious, in axillary spikes or clusters, the ♂ elongate, slender. *Calyx* in ♂ globose, splitting into 3—4 valvate lobes; in ♀ cupular, often enlarged in fruit, 4—10-lobed, the lobes imbricate. *Petals* 0. *Disk* 0. *Stamens* 4—8, the filaments cuneately dilated from below upwards; anthers didymous. *Ovary* 3-celled; ovule 1 in each cell; styles flattened, spreading, lobed; pistillode in ♂ minute. *Fruit* a capsule of 3, 2-valved, stellately pubescent cocci. *Seeds* subglobose; testa crustaceous; albumen fleshy; cotyledons flat.

COELODEPAS CALYCINUM, Bedd. Fl. t. 320; F. B. I. v. 419.

W. Gháts, hills of Tinnevely near Papanassam (Beddome), Sivagiri Hills (Wight).

A small tree with oblong acuminate crenate leaves reaching 7 in. long, 2 in. broad; ♂ flowers in very slender interrupted spikes of clusters and ♀ flowers in short spikes. The capsule is minutely fulvous tomentose, 4 in. in diam. Wood very hard (Bedd.). Vern. *Tam.* Kattupira.

35. *Alchornea*, Sw.

Trees or shrubs. *Leaves* alternate, entire or toothed, ribbed, usually stippellate at the base and glandular above at the base. *Flowers* dioecious or rarely monoecious, small, in simple or paniced spikes or racemes; ♂ small, clustered, ♀ solitary to a bract. *Calyx* in ♂ globose, closed in bud, splitting into usually 4 valvate lobes; in ♀ the 3—6 lobes, usually 4, imbricate. *Petals* 0. *Disk* 0. *Ovary* 2—3, rarely 4-celled; ovule 1 in each cell; styles distinct usually long and linear, simple or lobed; pistillode in ♂ 0. *Fruit* a capsule of 2—3 2-valved crustaceous cocci. *Seeds* subglobose, not strophiolate; testa crustaceous; albumen fleshy; cotyledons flat.

ALCHORNEA MOLLIS, Muell. Arg.; F. B. I. v. 420.

N. Circars, in the hills, in moist valleys (Roxburgh), at Ettrakonda in Godavari (V. Narayanswami).

A small tree with broadly ovate or suborbicular cuspidate-acuminate villous 3-ribbed stipellate leaves, up to 5 in. long, 3 in. broad, but Roxburgh gives the maximum as 12 and 8, which is quite likely especially with coppice shoots. The capsule is softly grey-pubescent. Vern. *Tel.* Badeki.

36. *Cleidion*, Blume.

Glabrous trees. *Leaves* alternate, toothed, penninerved. *Flowers* monoecious or dioecious, ♂ in long axillary racemes; ♀ single or in pairs on a long axillary peduncle; bracts very small. *Calyx* in ♂ globose at first, splitting into 2—4 valvate lobes; ♀ 3—5-lobed, the lobes imbricate. *Petals* 0. *Disk* 0. *Stamens* numerous, in a globose mass on a conical receptacle; filaments free; anthers dorsifixed, 4-celled or 2-celled, the cells transversely didymous on a broad connective. *Ovary* 2—4-celled; ovule 1 in each cell; styles connate below, with 2—3 long filiform arms; pistillode in ♂ 0. *Fruit* a capsule of

1—3 2-valved cocci. *Seeds* subglobose; testa coriaceous, sometimes with another membranous as well; albumen fleshy; cotyledons flat.

CLEIDION JAVANICUM, Blume; F. B. I. v. 444; Bedd. Fl. t. 272.

W. Gháts, in all Districts, in evergreen forests up to 3,000 ft., but not common.

A moderate-sized evergreen tree with elliptic acuminate long-petioled leaves up to 9 in. long, 4 in. broad, and capsules 1 in. in diam. Bark greenish-white, smooth; wood greyish-white, soft and not durable. Vern. Mal. Yellari.

37. *Macaranga*, Thouars.

Trees or shrubs. *Leaves* alternate, often large and peltate, entire or lobed, usually glandular beneath, 3—many-ribbed at the base; petioles often long and stipules large. *Flowers* usually dioecious, in axillary racemes or panicles, bracteate, the ♂ minute, in clusters, the ♀ one or few, to each bract; bract often large. *Calyx* in ♂ globose or obovoid, splitting into 3—5 valvate lobes; in ♀ 2—4-lobed. *Petals* 0. *Disk* 0. *Stamens* one or more central; filaments short, free; *anthers* 4-celled, or 2-celled and 4-valved. *Ovary* 2—6-celled, rarely by abortion 1-celled; ovule 1 in each cell; styles entire, short or long; pistillode in ♂ 0. *Fruit* a small capsule of 1 or more 2-valved cocci, sometimes echinate, often glandular or waxy. *Seeds* globose; testa crustaceous; albumen fleshy; cotyledons flat.

Leaves in all large and broadly peltate, orbicular-ovate, acuminate, entire or shortly toothed, with usually 9 radiating ribs at the base, the midrib with 7—12 pairs of nerves, the two next nerved on the outer side, the transverse nervules parallel:—

Panicle branches usually zigzag:—

Floral bracts small, usually with a large flat glandular appendage, the panicle branches shortly jointed; style lateral, subulate, stamens usually about 6—8

1. *indica*.

Floral bracts boat-shaped, toothed and acuminate, auricled at base, tomentose, the panicle branches with distant slender joints; stamens usually 4—6

2. *flexuosa*.

Panicle branches not zigzag; floral bracts broad and close, concealing the flowers, cup-like dentate and obtuse, very tomentose; style lateral, sessile, peltate, stamens 2—5, usually 3.....3. *peltata*

1. *MACARANGA INDICA*, Wt. Ic. t. 1883 and t. 1949 ii; F. B. I. v. 446; Bedd. Fl. t. 287, Fig. A.

W. Gháts, Nilgiris, hills of Malabar and Pulneys, at 3,000—6,000 ft. in second-growth forest chiefly.

A quick-growing tree with glaucous branchlets and large stipules, the leaves with round resinous yellow glands beneath, and usually softly tomentose. Bark grey, smooth; wood greyish-red, soft.

2. *MACARANGA FLEXUOSA*, Wt. Ic. t. 1949 iii.

W. Gháts, at Courtallum in Tinnevely (Wight).

A tree with glaucous branchlets and fulvous innovations, the leaves rather thin and greyish beneath with prominent large peltate glands.

3. *MACARANGA PELTATA*, Muell. Arg. *M. Roxburghii*, Wt. Ic. t. 1949 iv; F. B. I. v. 448. *M. tomentosa*, Wt. Ic. t. 1949 i; Bedd. Fl. t. 287 *Mappa* ? *peltata*, Wt. Ic. t. 817.

N. Circars, in hill valleys, especially in Rampa; Deccan, hills of Cuddapah; W. Gháts, in most Districts, in second-growth forest up to 3,000 ft.

A small resinous quick-growing tree with glaucous branchlets, large stipules and leaves glandular and more or less villous beneath. Bark pale, with lenticels; wood pale brown, soft, of no value. The red gum can be used for taking impressions. Vern. *Tam.* Vattakanni; *Mal.* Vatta.

38. *Claoxylon*, A. Juss.

Trees or shrubs, the buds not perulate. *Leaves* alternate, petioled, entire or glandular-dentate, stipules minute, early caducous. *Flowers* dioecious, rarely monoecious, in elongate racemes, often fascicled; bracts in ♂ usually 1—many, in ♀ 1-flowered. *Calyx* in ♂ closed in bud, subglobose, splitting valvately in 2—4 lobes; in ♀ usually 3-lobed. *Petals* 0. *Disk* in ♂ 0, in ♀ of hypogynous glands, free or connate in a cup. *Stamens* 10 or many, usually 20—30; filaments short or long; anthers erect, the cells distinct, connate at the base; often many glands or ciliate scales between the filaments. *Ovary* 2—4-celled; ovule 1 in each cell; styles free or connate only at the base, sometimes fringed. *Fruit* a capsule of 2—3 cocci dehiscing loculicidally. *Seeds* globose, not carunculate, arillate or not; testa crustaceous; albumen fleshy; cotyledons flat.

CLAOXYLON ANOMALUM, Hook. f.; F. B. I. v. 412.

Evergreen forests of Tinnevely about Courtallum (Wight), about Strathmore in Travancore at 3,500 ft. (Bourdillon).

A shrub with soft branches, oblong-lanceolate acuminate leaves with long petioles, flowers in rather dense spikes having no scales between the stamens and a white-pubescent capsule.

39. *Micrococca*, Benth.

Herbs or undershrubs, the buds not perulate. *Leaves* alternate, the lower rarely opposite, membranous, dentate, petioled; stipules minute. *Flowers* dioecious or monoecious, minute, in distant clusters on axillary racemes, the clusters often catkin-like with many imbricate bracts; the racemes solitary or fascicled, usually unisexual and various in arrangement; ♂ flowers pedicelled. *Calyx* of ♂ closed in bud, apiculate, splitting into 3 lobes; of ♀ 3—4, larger, imbricate. *Petals* 0. *Disk* in ♀ hypogynous, of linear glands. *Stamens* 3—30, central on a receptacle; filaments erect; anthers erect, the cells distinct obovoid, connate at base; glands or ciliate scales between the filaments. *Ovary* 3-celled; ovules 1 in each cell; styles free, plumose-laciniate. *Fruit* a capsule of 3 cocci dehiscing loculicidally and also septically. *Seeds* subglobose with a very thin arillus; testa crustaceous; albumen fleshy; cotyledons flat.

Perennial undershrubs:—

Racemes elongate-filiform, about 4 in. long, glabrous or hispid, the flower-clusters distant; leaves glabrous, elliptic-lanceolate, coarsely dentate or entire, acuminate at both ends, up to 7 in. long, 1.5 in. broad, long-petioled

1. *Beddomei*.

Racemes short, under 2 in. long, hairy, the flower-clusters fairly close; leaves sparsely softly white- or fulvous-silky, lanceolate, entire or crenate, acute at both ends, up to 3 in. long, 1 in. broad (in the var. larger), petioles short...2. *Wightii*.

Annual herbs; racemes erect, androgynous, filiform, up to about 3 in. long, hispid; leaves ovate, acute, usually rounded at base, crenate, up to 2.5 in. long, 1.25 in. broad, the petioles slender.....3. *Mercurialis*.

1. *MICROCocca BEDDOMEI*, Prain in Ann. Bot. xxv. 630. *Claoxylon Beddomei*, Hook. f.; F. B. I. v. 413. *C. indicum*, Bedd. Ic. t. 231, not of Hassk.

W. Ghâts, Anamalais and hills of Travancore and Tinnevely, up to 6,000 ft.

An undershrub, nearly glabrous or sparsely hispid on the racemes and branchlets, the capsule glabrous or strigose-hispid.

2. *MICROCocca WIGHTII*, Prain l.c. *Claoxylon Wightii* Hook. f.; F. B. I. v. 413.

W. Ghâts, hills of Tinnevely (Wight, Beddome).

A slender undershrub with narrow leaves up to 1 in. broad.

Var. *hirsutum*, Prain. *Claoxylon hirsutum*, Hook. f.; F. B. I. v. 413, leaves larger, densely yellowish-silky with long spreading soft hairs, as is the capsule. Hills of Tinnevely, Singampatti at the Snake falls 2,500 ft. (Beddome).

3. *MICROCocca MERCURIALIS*, Benth. *Claoxylon Mercurialis*, Thw.; F. B. I. v. 412.

Most plains Districts, a weed of cultivated land and roadsides.

An annual herb, reaching 2 ft. in height, the capsule glabrous or sparsely hispid.

40. *Acalypha*, Linn.

Herbs or shrubs. *Leaves* alternate, usually serrate or crenate, rarely entire, penninerved or 3—5-ribbed; petioles often long. *Flowers* usually monoecious, in axillary or terminal spikes or racemes; ♂ very minute, sometimes separate, sometimes lower, more usually upper, with or without small bracts; ♀ bracteate, the bracts generally leafy and concave; bracteoles very small. *Calyx* in ♂ of 4 minute valvate membranous lobes, at first combined; in ♀ of 3—4 minute imbricate lobes. *Petals* 0. *Disk* 0. *Stamens* many, often 8, on a convex receptacle; filaments short, free; anther-cells distinct, divaricate, often at length twisted or flexuous. *Ovary* 3-celled; ovule solitary in each cell; styles filiform, often very long and lacinate; pistillode in ♂ 0. *Fruit* a small capsule of 3 small, 2-valved, crustaceous cocci. *Seeds* subglobose; testa crustaceous; albumen fleshy; cotyledons flat.

Flowers of ♀ pedicelled, with minute bracts, in terminal lax panicles; those of ♂ in very slender axillary spikes; leaves membranous long-petioled, ovate, acuminate, rounded truncate or even cordate at base, strongly serrate, sparsely hairy, up to 4 in. long, 2.5 in. broad.....1. *paniculata*.

Flowers of ♀ sessile with fairly large or small bracts:—

Flowers of ♀ in terminal short spikes, of ♂ axillary, in slender spikes; bracts of ♀ broad and dentate, enclosing the capsule; leaves ovate, acute, rounded or cordate at base, crenate, pubescent, up to 2 in. long, 1.25 in. broad...2. *alnifolia*.

Flowers of both ♂ and ♀ in axillary spikes, the ♂ uppermost and few:—

Bracts rather large, .2—3 in. long, leafy, dentate, folded, alternate on erect spikes; ♂ flowers minute, followed by a tuft of sterile flowers; leaves long-petioled, ovate or rhombic ovate, acute, cuneate at base, crenate-serrate, up to 3 in. long, 2 in. broad, glabrous.....3. *indica*.

Bracts moderate-sized, longer than the capsules, .15—3 in. long; spikes short, rarely 1 in. long.—

Bracts deeply 3—5-lobed, 3 longer lobes strap-shaped, long-ciliate; leaves membranous, long-petioled, ovate, acuminate, cordate at base, crenate, hispid, up to 3 in. long, 1.5 in. broad; capsules hispid.....4. *brachystachya*.

Bracts campanulate, with many nerves ending in long subulate hispid teeth; leaves membranous, long-petioled, ovate, cuspidate-acuminate, rounded or cuneate at base, serrate, glandular, up to 3.5 in. long, 1.5 in. broad; capsules glabrous.....5. *ciliata*.

Bracts folded, shortly toothed, the teeth with gland-tipped hairs, otherwise glabrous; leaves ovate or lanceolate, acute, crenate-serrate, hispid, up to 1.5 in. long, .75 in. broad; capsules hispid.....6. *malabarica*.

Bracts small, shorter than the capsules, .5 in. long, dentate, hispid; spikes elongate, more than 1 in. long; leaves membranous, long-petioled, ovate or lanceolate, acute, cuneate at base, crenate-serrate, up to 2.5 in. long and nearly as broad, but usually smaller; capsules hispid with glandular-based hairs.....7. *lanceolata*.

Flowers of ♀ few, sessile at the base of slender many-flowered ♂ spikes about 1 in. long; bracts folded, cuneate, villous and glandular, .15 in. long; leaves ovate, obtusely acuminate or acute, cuneate at base, crenate, glabrous, glandular beneath, up to 3 in. long, 1.5 in. broad; capsules tomentose with large yellow glands in the sinuses.....8. *fruticosa*.

1. *ACALYPHA PANICULATA*, Miq.; F. B. I. v. 415.
Carnatic, hills of S. Arcot; W. Gháts, in all Districts from the Wynaad southwards, in shady moist places up to 4,000 ft.
A small branching undershrub.
2. *ACALYPHA ALNIFOLIA*, Klein ex Willd.; F. B. I. v. 415.
Deccan and Carnatic, westwards to the E. slopes of the W. Gháts, up to about 3,000 ft.
A small shrub, the stems usually with long soft shining hairs, the stems and leaves sometimes grey-tomentose.
3. *ACALYPHA INDICA*, Linn.; F. B. I. v. 416; Wt. Ic. t. 877.
All plains Districts and in the lower hills, a weed of gardens, roadsides and cultivated land.
An erect annual herb. Vern. *Tam.* Kupamani.
4. *ACALYPHA BRACHYSTACHYA*, Hornem.; F. B. I. v. 416.
W. Gháts, Mysore, Nilgiris, Anamalais and Pulneys, usually above 3,000 ft. in shade of Shola forests.
A slender flaccid annual herb, 1 ft. or little more in height.
5. *ACALYPHA CILIATA*, Forsk.; F. B. I. v. 417.
Deccan, hills of Kurnool; W. Gháts, in all Districts, in forest undergrowth, at 1,000—4,000 ft.
An erect annual herb up to 2 ft. in height.
6. *ACALYPHA MALABARICA*, Muell. Arg.; F. B. I. v. 416.
S. Canara and Mysore.
A rather stout leafy annual herb, up to 1 ft. in height.

7. ACALYPHA LANCEOLATA, Willd. *A. fallax*, Muell. Arg.; F. B. I. v. 416.
N. Circars, Deccan and Carnatic to S. Travancore, on waste land and in fields.
An annual herb, reaching 18 in. in height, the stems often clothed with long silky deciduous hairs, the leaves variable in shape.
8. ACALYPHA FRUTICOSA, Forsk.; F. B. I. v. 415.
Deccan and Carnatic, West to the E. slopes of the W. Gháts, in dry localities.
A strong-smelling shrub with many yellow waxy glands, much branching.

A. Wilkesiana, Muell. Arg., is a shrub from the Fiji Islands very commonly grown in gardens for its coloured highly ornamental leaves and flower-spikes.

41. *Tragia*, Linn.

Perennial herbs, usually climbing, hispid with stinging hairs. *Leaves* alternate, simple or palmately 3-lobed, serrate, 3—5-ribbed at the base; stipules prominent at first, early deciduous. *Flowers* monoecious in terminal or leaf-opposed androgynous racemes, the ♂ uppermost, the ♀ below and few. *Calyx* in ♂ globose or obovoid, valvately 3—5-partite; in ♀ of 6 imbricate, usually pinnatifid, lobes, enlarged, hardened, and spreading stellately in fruit. *Petals* 0. *Disk* 0. *Stamens* 1—3, rarely more, usually 3; filaments free or connate; anthers with contiguous parallel cells. *Ovary* 3-celled; ovule 1 in each cell; styles united in a column, spreading above. *Fruit* a capsule of 3 2-valved cocci; endocarp crustaceous. *Seeds* globose; testa crustaceous; albumen fleshy; cotyledons broad, flat.

Leaves simple:—

Leaves not cordate at base, acute in uppermost or younger, rounded in lower or older ones, the large ones broadly ovate, abruptly acuminate, coarsely serrate, up to 4 in. long, 3 in. broad, longer and much narrower in the var.; fruiting calyx-lobes with narrow glabrous midrib and 4—6 pairs of short hispid teeth

1. *involutrata*.

Leaves cordate at base:—

Fruiting calyx-lobes oblong with 4—8 pairs of teeth, long and stiffly strigose:—

Upper branchlets and leaves densely fulvous-tomentose, the leaves (at any rate young ones) pale on the lower surface; lower leaves ovate-cordate, acuminate, regularly serrate, up to 5 in. long, 3 in. broad; midrib of fruiting calyx-lobes hispid within, teeth fulvous-hispid.....2. *bicolor*.

Upper branchlets and leaves sparsely greyish hispid; lower leaves broadly ovate-cordate, membranous, nearly glabrous, serrate, up to 5 in. long, 3 in. broad; midrib of fruiting calyx-lobes glabrous within, the teeth slender, white-hispid.....3. *hispidula*.

Fruiting calyx-lobes broadly ovate with many small teeth, glabrous on the middle of both sides, densely white-strigose on the margins; leaves membranous, green, nearly glabrous, broadly ovate-cordate, acuminate, coarsely serrate, up to 6 in. long, 4 in. broad.....4. *Muelleriana*.

Leaves palmately 3-partite, the middle lobe the longest and sometimes alone, the lobes pinnatifid, hispid and grey, about 3 in. long; fruiting calyx-lobes rather narrow, with 8—10 straight teeth, sparsely white-strigose.....5. *cannabinia*.

1. *TRAGIA INVOLUCRATA*, Linn.; F. B. I. v. 465.

N. Circars, Deccan and Carnatic to S. Travancore.

An evergreen climbing hispid herb with stinging bristles, variable in foliage, the leaves rather thick. Vern. *Hind.* Barhanta.

Var. *angustifolia*, Hook. f. Leaves long and narrow, up to 6 in. long, .5–.75 in. broad; fruiting calyx-lobes with very short teeth. Hills of N. Coimbatore at 4,000 ft. (Fischer); Pulney Hills (Bourne, van Malderen).

2. *TRAGIA BICOLOR*, Miq.; F. B. I. v. 465.

W. Gháts, Nilgiri and Pulney Hills, at 5,000–6,000 ft., in Shola forests.

A slender climbing stinging herb, hispid below, bright golden-tomentose on the innovations.

3. *TRAGIA HISPIDA*, Willd. *T. involucrata*, Linn.; F. B. I. v. 465 in part.

W. Coast, S. Canara and Malabar.

A slender climbing stinging herb.

4. *TRAGIA MUELLERIANA*, Pax and K. Hoffm. *T. involucrata*, Linn., var. *cordata*, Muell. Arg.; F. B. I. v. 465.

W. Gháts, Wynad to the hills of Cochin, at 3,000–5,000 ft. in evergreen forest.

A slender stinging climbing herb.

5. *TRAGIA CANNABINA*, Linn. f. *T. involucrata* var. *cannabina*, Muell. Arg.; F. B. I. v. 465.

N. Circars, Deccan and Carnatic, in hedges and on waste lands.

A hispid erect or climbing shrub with stinging hairs, the leaves variable, sometimes not tripartite, sometimes with long narrow lobes.

42. *Homonoia*, Lour.

Rigid shrubs. *Leaves* alternate, glandular-scaly beneath; stipules slender, deciduous. *Flowers* dioecious, in axillary or lateral spikes, bract 1, bracteoles 2. *Calyx* in ♂ globose in bud, splitting valvately in 3 lobes; in ♀ of 5–8 small imbricate caducous lobes. *Petals* 0. *Disk* 0. *Stamens* very numerous, in a dense globose cluster of repeatedly branching filaments; anthers with 2 subglobose divaricate cells. *Ovary* 3-celled; ovule 1 in each cell; styles 3 spreading and very papillose. *Fruit* a capsule of 3 2-valved cocci. *Seeds* ovoid; testa crustaceous with an outer fleshy coat; albumen fleshy; cotyledons flat.

Leaves linear or linear-oblong, acute or rarely obtuse, entire or more or less serrulate towards the apex, glabrous above, very glandular-scaly beneath, up to 7 in. long, .5 in. broad; spikes in both ♂ and ♀ elongate.....1. *riparia*. Leaves obovate or oblanceolate, emarginate, cuneate at base, serrate-dentate, glabrous above, sparsely glandular-scaly beneath, 1–1.5 in. long, .5–.7 in. broad; spikes in both ♂ and ♀ short.....2. *retusa*.

1. *HOMONOIA RIPARIA*, Lour.; F. B. I. v. 455. *Adelia neriiifolia*, Roth.; Wt. Ic. t. 1868.

All Districts, at lower levels, in the beds of rivers and streams, especially among rocks.

An evergreen shrub. Bark brown; wood grey or greyish-brown, moderately hard, close-grained. Vern. *Tel.* Taniki; *Mal.* Katallári.

2. *HOMONOIA RETUSA*, Muell. Arg.; F. B. I. v. 456. *Adelia retusa*, Wt. Ic. t. 1869.

N. Circars from the Godavari southwards; Deccan and Carnatic in places, in river beds, not common.
A small shrub.

43. *Lasiococca*, Hook. f.

Small trees. *Leaves* alternate opposite or subverticillate, entire, penninerved, eglandular, shortly petioled; stipules deciduous. *Flowers* monoecious or dioecious, ♂ in racemes, ♀ solitary, axillary or lateral; bracts small. *Calyx* of ♂ flower globose, splitting valvately in 3 lobes; of ♀ of 5—7 unequal lobes, persistent and accrescent in fruit. *Petals* 0. *Disk* 0. *Stamens* numerous, in a much-branched column of filaments; anthers many, cells globose, divaricate with arching connectives. *Ovary* 3-celled; ovule 1 in each cell; styles 3, filiform, erect, with papillose stigmatic surfaces. *Fruit* a capsule of 3 cocci, deciduous from a 3-cornered columella, covered with bristles or conical tubercles. *Seeds* subglobose, smooth; testa crustaceous; albumen fleshy; cotyledons thin, subcordate.

LASIOCocca COMBERI, Haines in Kew Bull. 1920, 70.

N. Circars, hills of Vizagapatam, at 3,000—4,000 ft. (A. W. Lushington).

A small tree with obovate, or somewhat panduriform leaves obtusely abruptly acuminate at apex, narrowed and then cordate at base, up to 6 in. long, 2 in. broad. The ♀ flowers are long-peduncled and the capsules covered with conical tubercles ending in a hair.

44. *Ricinus*, Linn.

A tall glabrous glaucous annual shrub. *Leaves* alternate, palmately lobed with 7 or more serrate lobes. *Flowers* monoecious, in terminal paniculate racemes, the upper ♂, crowded, the lower ♀. *Calyx* in ♂ membranous, splitting into 3—5 valvate lobes; in ♀ spathaceous, caducous. *Petals* 0. *Disk* 0. *Stamens* very many, the filaments connate and repeatedly branched; anthers with distinct distant subglobose divergent cells. *Ovary* 3-celled; ovule 1 in each cell; styles entire 2-fid or 2-partite, papillose. *Fruit* a capsule of 3 2-valved cocci, prickly without. *Seeds* oblong; testa crustaceous, marbled; albumen fleshy; cotyledons broad.

RICINUS COMMUNIS, Linn.; F. B. I. v. 457.

Cultivated and found run wild in the fields and gardens, by roadsides and on waste land. Castor-oil plant.

Often almost a small tree with a thin greyish-brown bark and soft white wood. It is cultivated for the oil which is expressed from the seeds and used for burning, as a lubricant and in medicine. Vern. *Hind.* Arend; *Tam.* Sittamunuk; *Tel.* Amadam; *Kan.* Haralu.

45. *Dalechampia*, Linn.

Shrubs or undershrubs, often climbing. *Leaves* alternate, entire or 3—5-lobed or foliolate. *Flowers* monoecious, in dense axillary peduncled heads, with a pair of large leafy usually coloured bracts; ♂ central with an involucl of smaller bracts and sometimes processes representing sterile flowers; ♀ lateral and basal also with an involucl of smaller bracts. *Calyx* in ♂ globose splitting into 4—6 valvate lobes; in ♀ of 5—12 fimbriate or lacerate imbricate lobes. *Petals* 0. *Disk* 0. *Stamens* many, 20—30, the filaments connate below in a column inserted on the convex receptacle; anthers with parallel cells. *Ovary* 3—4-celled; ovule 1 in each cell; styles connate in a stout thickened column with a terminal entire or slightly lobed stigma. *Fruit* a deeply lobed capsule splitting into 3—4 2-valved cocci, the valves hard. *Seeds* globose, not caruncled; testa crustaceous; albumen fleshy; cotyledons broad, flat.

Leaves 3-foliolate, the leaflets sessile or very shortly petiolulate, the 2 lower with rounded and often lobed blades enlarged below, the mid-lobe ovate, acuminate, 2—3 in. long, all glabrous; outer bracts 3-lobed, about 1 in. long, inner also lobed; calyx of ♂ of 4 entire lobes, of ♀ of 8—12 nearly linear lobes with stalked marginal glands; anthers not apiculate.....1. *indica*.
Leaves 3-lobed, the 2 lower enlarged below, the midlobe ovate, acute, up to 4 in. long, all tomentose; outer bracts 3-fid, about 1.5 in. long, inner entire; calyx of ♂ of 6 entire lobes, of ♀ of 8—10 pinnatifid long strigose lobes; anthers apiculate.....2. *velutina*.

1. *DALECHAMPIA INDICA*, Wt. Ic. t. 1882; F. B. I. v. 467.

Carnatic, from the Nellore Veligondas (Heyne) and the Kam-bakam Hills of Chingleput (Rangachari) southwards and westwards to the E. slopes of the W. Ghâts.

A slender twining undershrub with large yellow involuclal bracts and slender short fruiting calyx, very glandular.

2. *DALECHAMPIA VELUTINA*, Wt. Ic. t. 1881; F. B. I. v. 467.

W. Ghâts, Nilgiri Hills, above 5,000 ft. (Wight, King, Bidie, Fischer).

A slender twining undershrub with large bracts and conspicuously strigose fruiting calyx.

46. *Ostodes*, Blume.

Trees or shrubs. *Leaves* alternate, entire or serrate, usually penninerved, stipular. *Flowers* dioecious or monoecious, in lax terminal and lateral paniced usually pendulous racemes, ♂ in fascicles, ♀ in separate racemes or solitary in ♂ ones. *Calyx* of 5 broad unequal imbricate lobes. *Petals* 5—6, larger, longer than calyx-lobes. *Disk* of 5 glands or annular. *Stamens* numerous, on a convex or columnar receptacle; filaments free; anthers dorsifixed, connective broad. *Ovary* 3-celled; ovule 1 in each cell; styles short, 2-cleft. *Fruit* a large subglobose 6-ribbed capsule, the exocarp separable from the hard endocarp, breaking up into 3 2-valved cocci. *Seeds* ovoid; testa crustaceous with a fleshy outer layer; albumen fleshy; cotyledons broad, flat.

OSTODES ZEYLANICUS, Muell. Arg.; F. B. I. v. 400; Bedd. Fl. t. 274.

W. Ghâts, Wynaad, Anamalais, Atapadi Hills of Malabar and hills of Travancore, up to 3,000 ft.

A large tree with large long-petioled oblong or oblanceolate distantly serrate leaves, up to 12 in. long, 4 in. broad. Wood white, soft and perishable.

Var. *minor*, Thw. Leaves smaller, up to 7 in. long, fewer-nerved and nearly entire, the racemes shorter, the capsule smaller and tomentose.

W. Ghâts, Wynaad (Lawson) to Travancore.

47. *Dimorphocalyx*, Thw.

Glabrous trees. *Leaves* alternate, entire, penninerved, stipulate. *Flowers* dioecious, ♂ usually in axillary cymes or racemes or solitary, ♀ solitary or 2—3 together and terminal or leaf-opposed. *Calyx* in ♂ cup-shaped with 5 small lobes; in ♀ large, of 5 oblong obtuse imbricate lobes, enlarged and spreading in fruit. *Petals* 5, erect, imbricate. *Disk* in ♂ of glands, in ♀ annular. *Stamens* 10—20, usually in 2 rows, on a short column; filaments thick; anthers dorsifixed, the cells adnate to the thick connective, parallel or divergent. *Ovary* 3-celled; ovule 1 in each cell; styles 3, connate at the base, bifid. *Fruit* a capsule of 3 2-valved crustaceous cocci surrounded at the base by the persistent calyx-lobes. *Seeds* ovoid, testa crustaceous; albumen fleshy; cotyledons flat.

Fruiting calyx obovate, obtuse, .25—.5 in. long, with a glandular pit on back near the tip; leaves elliptic or lanceolate, obtuse or acute, up to about 5 in. long, 2 in. broad; capsule .5 in. long, slightly hispid-villous, shortly lobed...1. *glabellus*. Fruiting calyx elliptic-oblong or lanceolate, emarginate, .5—1 in. long, the lobes unequal; leaves elliptic-oblong or lanceolate, usually long-, but obtusely-acuminate, up to 7 in. long, 2.5 in. broad; capsule .5—7 in. long, villous, scarcely lobed

2. *Lawianus*.

1. DIMORPHOCALYX GLABELLUS, Thw.; F. B. I. v. 403; Trimen Fl. Ceyl. t. 84.

N. Circars, coast scrub near the sea, Vizagapatam (W. Elliot, Gamble); W. Ghâts, Anamalais and hills of Tinnevely.

A small much-branched tree, the leaves reddish brown when dry and rather thin, the branchlets nearly white.

2. DIMORPHOCALYX LAWIANUS, Hook. f.; F. B. I. v. 404; *Trigonostemon Lawianus*, Bedd. Fl. t. 273.

W. Ghâts, in all Districts, western side, in evergreen forests, up to 4,000 ft.

A small or moderate-sized tree with nearly white branchlets. Wood white, hard, close-grained.

48. *Blachia*, Baill.

Glabrous shrubs or small trees. *Leaves* alternate or sub-opposite, petioled, entire, penninerved. *Flowers* monoecious or subdioecious, ♂ terminal, umbellate or racemose, on filiform pedicels, ♀ solitary or fascicled, on thickened pedicels. *Sepals* in ♂ 4—5, membranous, concave, imbricate; in ♀ lanceolate or oblong, in fruit sometimes accrescent, sometimes caducous. *Petals* in ♂ 4—5, small, rounded, hyaline; in ♀ 0. *Disk* in ♂ of scale-like glands alternating with the

petals; in ♀ annular. *Stamens* 10—20, on a convex receptacle; filaments free; anther-cells on the margin of the connective, at length confluent. *Ovary* 3—4-celled; ovule 1 in each cell; styles distinct, filiform, 2-partite. *Fruit* a capsule of 3 2-valved cocci. *Seeds* oblong, estrophiolate; testa crustaceous, often mottled, shining; albumen fleshy; cotyledons broad, flat.

Flowers of ♂ in umbels:—

Calyx of ♀ scarcely enlarged in fruit, the lobes reflexed; leaves ovate or obovate, obtuse or cuspidate-acuminate, up to 3 in. long, 1.5 in. broad; capsule 4 in. long, not deeply lobed, smooth.....1. *reflexa*.
Calyx of ♀ enlarged in fruit, the lobes erect; leaves ovate or obovate, acuminate, narrowed at base, up to 7 in. long, 3 in. broad; capsule 6 in. long, deeply lobed.....2. *umbellata*.

Flowers of ♂ in racemes:—

Calyx of ♀ enlarged in fruit, the lobes spreading, leaves lanceolate or elliptic-rhomboid, acuminate, cuneate at base, up to 5 in. long, 2 in. broad; capsule 4 in. long, with shallow lobes.....3. *calycina*.
Calyx of ♀ deciduous after flowering; leaves oblong-lanceolate or ovate, unequal-sided, up to 5 in. long, 2 in. broad; capsule 3—5 in. long, prominently lobed.....4. *denudata*.

1. *BLACHIA REFLEXA*, Benth.; F. B. I. v. 402.
W. Gháts—"Nilgiris and Coorg" (G. Thomson), Travancore (Bourdillon) in evergreen forests, about 1,000 ft.
A shrub.
2. *BLACHIA UMBELLATA*, Baill.; F. B. I. v. 402.
W. Gháts, Coorg, Wynaad and hills of Travancore and Tinnevely, in evergreen forests, at 1,000—3,000 ft.
A shrub or small tree.
3. *BLACHIA CALYCINA*, Benth.; F. B. I. v. 402. *Croton umbellatum*, Wt. Ic. t. 1874.
W. Gháts, hills of Travancore and Tinnevely, in evergreen forests, at 1,000—2,000 ft.
A shrub.
4. *BLACHIA DENUDATA*, Benth.; F. B. I. v. 403.
W. Gháts, S. Canara (Beddome); Bababudan Hills of Mysore (Law).
A shrub or small tree, the specimens probably right but a little uncertain, as the leaves are so variable.

49. *Jatropha*, Linn.

Herbs, shrubs or trees, often glandular or prickly. *Leaves* alternate, entire or palmately-lobed or -partite; stipules often ciliate. *Flowers* monoecious, in terminal cymes; the central flowers of the cyme or its forks usually ♀. *Calyx* of 5 often coloured imbricate lobes. *Petals* 5, contorted, free or connate, sometimes absent in ♀. *Disk* entire or of 5 glands. *Stamens* numerous; filaments connate or those of the outer series free; anthers erect, ovate or oblong, the cells parallel, contiguous. *Ovary* 2—4-celled; ovule solitary in each cell; styles connate below, 2-fid above, the lobes entire or again bifid. *Fruit* a capsule of 2—4 2-valved cocci; endocarp crustaceous or bony. *Seeds* ovoid or oblong; testa crustaceous; albumen fleshy; cotyledons broad, flat.

Petals free or nearly so:—

Leaves without glands, 3-lobed to below the middle, sometimes simple, sometimes 5-lobed, the lobes long and narrow, the base cuneate, length up to 8 in., stipules capillary; capsule 3—7 in. long, often pustulate.....1. *heterophylla*.

Leaves glandular, palmately 3—5-lobed to below the middle:—

Leaves serrate, each tooth ending in a gland-tipped bristle, lobes obovate, shortly acuminate; stipules very long with many filiform glandular-tipped divisions; capsule 4—5 in. long; rugose.....2. *glandulifera*.

Leaves entire, the margins with a close row of shortly stipitate viscid glands which occur, though longer and branched, on the petioles and short stipules, lobes obovate, shortly acute; capsule 4 in. long, reticulate-rugose

3. *gossypifolia*.

Petals connate to the middle or above it:—

Glabrous, the leaves not peltate, orbicular-cordate, entire or 3—5-lobed or -angled, up to 6 in. in diam.; capsule subglobose or ellipsoid, about 1 in. long, rugose.....4. *Curcas*.

Branchlets and leaves beneath fulvous-tomentose, the leaves peltate, suborbicular, obtusely 5—7-lobed, up to about 6 in. in diam.; capsule globosely oblong, up to 1 in. long.....5. *Wightiana*.

1. *JATROPHA HETEROPHYLLA*, Heyne; F. B. I. v. 382.

Deccan, from Nellore and Cuddapah westwards to Coimbatore and the N. side of Nilgiris, on dry stony ground.

A small low glabrous shrub branching from a tuberous rootstock, the flowers greenish.

2. *JATROPHA GLANDULIFERA*, Roxb.; F. B. I. v. 382.

Deccan and Carnatic, from the Kistna river southwards, often on black cotton soil.

A shrub with stout thick branches with a smooth papery pale bark, the flowers greenish-yellow.

3. *JATROPHA GOSSYPIFOLIA*, Linn.; F. B. I. v. 383.

All plains Districts, on roadsides and in waste places, a common weed, introduced from Brazil, and quite naturalized.

A small dark-coloured shrub with soft wood and reddish flowers. Vern. *Tam.* Atalai; *Tel.* Nela-amida.

4. *JATROPHA CURCAS*, Linn.; F. B. I. v. 383.

All plains Districts, about villages and in hedges, an American plant, cultivated and naturalized. Physic Nut.

A shrub or small tree with yellowish-green flowers. Bark greenish-white, smooth, peeling off in thin flakes; wood white, very soft. The seeds give a medicinal oil. Vern. *Hind.* Bagberenda; *Tel.* Nepalam; *Tam.* Kaat-amunak.

5. *JATROPHA WIGHTIANA*, Muell. Arg.; F. B. I. v. 383. *J. peltata*, Wt. Ic. t. 1169 (*J. villosa* in text).

W. Deccan, Mysore and Coimbatore, in dry stony scrub. A low branching shrub with pale yellowish flowers.

J. multifida, Linn., the Coral Plant, is a glabrous shrub, native of America, which is commonly cultivated in gardens. It has handsome leaves of orbicular outline very much cut palmately into narrow lobes, while the peduncles and flowers are bright red. Some other species of the genus are also occasionally found in gardens in cultivation.

50. *Tritaxis*, Baill.

Trees or shrubs. *Leaves* alternate, entire or toothed, penninerved. *Flowers* usually monoecious in terminal dichotomous cymes, the central flower of each cyme subsessile ♀, surrounded by many ♂ pedicelled. *Calyx* 5-lobed. *Petals* 5, longer than the calyx-lobes. *Disk* of 5 glands. *Stamens* in 2—3 whorls, the inner or all forming a central column; anthers of the outer whorl erect, of the inner horizontal, the cells parallel, introrse. *Ovary* 3-celled; ovule 1 in each cell; styles 2-fid. *Fruit* a capsule of 3 2-valved cocci.

TRITAXIS BEDDOMEI, Benth.; F. B. I. v. 384.

W. Ghâts, hills of Tinnevely and Travancore (Beddome).

A small tree with slender terete branches, thinly coriaceous leaves reaching 4 in. in length, and terminal branching cymes.

51. *Trigonostemon*, Blume.

Evergreen trees or shrubs. *Leaves* alternate, penninerved. *Flowers* monoecious, in axillary or terminal spikes, racemes or cymes. *Calyx* of 5 imbricate lobes. *Petals* 5, sometimes 0 in ♀. *Disk* of 5 glands, often united in a lobed cup. *Stamens* 3 or 5, connate in a short column with free spreading tips; anthers erect or horizontal, the cells united by their bases. *Ovary* 3-celled; ovule 1 in each cell; styles bifid or twice bifid, rarely entire. *Fruit* a capsule of 3 2-valved cocci. *Seeds* ovoid or globose; testa crustaceous, mottled; albumen fleshy; cotyledons broad, flat.

TRIGONOSTEMON NEMORALIS, Thw.; F. B. I. v. 398; Bedd. Ic. t. 182.

W. Ghâts, Wynaad (Beddome), hills of Tinnevely, in evergreen forests, at 2,000—3,000 ft., often on river banks.

A shrub or small tree with elliptic-oblong or lanceolate sinuate-lobed leaves reaching 6 in. long, the young parts and inflorescence strigose-hairy, the flowers red.

52. *Givotia*, Griff.

A tree, conspicuously softly white-stellate-tomentose on branchlets, inflorescence and undersurface of leaves. *Leaves* alternate, broadly ovate or orbicular, cordate, coarsely dentate, palmately ribbed, long-petioled. *Flowers* dioecious, in axillary or subterminal racemose or paniculate cymes; pedicels jointed; bracts linear, conspicuous. *Calyx* of 5 oblong imbricate lobes. *Petals* 5, longer than the calyx-lobes, cohering in a campanulate corolla. *Disk* of ♂ of orbicular glands, of ♀ cupular. *Stamens* 13—25, on a villous receptacle; filaments erect, connate below; anthers ovate, dorsifixed, the cells parallel. *Ovary* 2—3-celled; ovule 1 in each cell; styles short, spreading, 2-fid. *Fruit* a sub-globose drupe, 1 seeded. *Seed* globose or ellipsoid; testa bony; albumen fleshy; cotyledons flat.

GIVOTIA ROTTLEIFORMIS, Griff.; F. B. I. v. 395; Wt. Ic. t. 1889; Bedd. Fl. t. 285.

Deccan, hilly country in Hyderabad and the Ceded Districts to Coimbatore; hills of the Carnatic to S. Travancore; E. slopes of W. Ghats, in dry deciduous forests chiefly.

A moderate-sized tree conspicuous for its large leaves densely white-tomentose beneath reaching a diameter of up to 10 in. The flower-panicles are usually more fulvous-tomentose, with distant clusters, the drupe 1 in. long. Bark brown, smooth, peeling off in circular scales; wood white, very light and soft, used for carved images, toys, lacquered articles and catamarans. The seeds give an oil. Vern. *Tel.* Tella puliki; *Tam.* Vendalai.

53. *Baliospermum*, Blume.

Erect shrubs or undershrubs. *Leaves* alternate, minutely lobed, palminerved or penninerved, biglandular at base. *Flowers* small, monoecious or dioecious, in fascicles, panicles or racemes. *Calyx* in ♂ globose, opening in 4–5 membranous concave imbricate lobes; in ♀ of 5–6 lanceolate entire or toothed lobes sometimes accrescent in fruit. *Petals* 0. *Disk* in ♂ of 4–6 glands, in ♀ annular. *Stamens* numerous, 10–30, on a central receptacle; filaments slender, free; anthers terminal, the cells adnate to the broad connective. *Ovary* 3-celled; ovule 1 in each cell; styles stout, 2-fid or 2-partite with smooth stigmatic surfaces. *Fruit* a capsule of 3 2-valved crustaceous cocci. *Seeds* ovoid, caruncled; testa crustaceous; albumen fleshy; cotyledons flat.

BALIOSPERMUM MONTANUM, Muell. Arg. *B. axillare*, Blume; F. B. I. v. 461. *B. polyandrum*, Wt. Ic. t. 1885.

N. Circars, Deccan and W. Coast, in shady places, at low levels. A stout leafy undershrub from 3–6 fr. high with leaves very variable in shape and size, the large ones ovate oblong or rounded, often 12 in. long and long-petioled, the small upper ones lanceolate. The seeds give a medicinal oil. Vern. *Hind.* Danti.

54. *Gelonium*, Roxb.

Evergreen glabrous trees or shrubs, the branches with stipular lines at the nodes. *Leaves* alternate or sometimes opposite, pellucid-punctate, entire or serrate; stipules connate, sheathing, caducous. *Flowers* small, dioecious, in axillary cymes or clusters. *Calyx* in ♂ of 5 concave orbicular imbricate lobes, in ♀ of 5–6 narrower lobes. *Petals* 0. *Disk* in ♂ 0, in ♀ cupular, the glands large, peripheric. *Stamens* 10–60, free, central on a convex receptacle, often mixed with rugose glands; filaments filiform; anthers oblong, dorsifixed, the cells parallel. *Ovary* 2–4-celled; ovule 1 in each cell; styles minute, reniform semilunate or bifid, depressed. *Fruit* a globose or obscurely lobed usually fleshy or crustaceous capsule. *Seeds* subglobose, arillate; testa crustaceous; albumen fleshy; cotyledons flat.

Flowers rather large, many, in cymes or clusters; leaves elliptic or elliptic-oblong, acute, up to 7 in. long; capsule rough, obscurely lobed, 5–75 in. in diam.

1. *multiflorum*.

Flowers small, rather few, in fascicles; leaves obovate or oblanceolate, obtuse, up to 4 in. long, but usually less; capsules smooth, deeply lobed, keeled on the lobes, 3–4 in. in diam. 2. *lanceolatum*.

1. *GELONIUM MULTIFLORUM*, A. Juss.; F. B. I. v. 459.
N. Circars, in evergreen forests and shady places; Travancore, but perhaps cultivated.
A small evergreen tree with coriaceous shining leaves. Bark grey, wood yellowish-white, close-grained. Vern. *Ur*. Khakra.
2. *GELONIUM LANCEOLATUM*, Willd.; F. B. I. v. 459; Wt. Ic. t. 1867.
N. Circars and Deccan, in hilly country; W. Gháts, Cochin and Travancore, at low levels, in evergreen forest. A small evergreen tree with shining pale coriaceous leaves Vern. *Tel*. Suragada; *Tam*. Kakaipalai.

55. *Sebastiania*, Spreng.

Herbs or shrubs. *Leaves* alternate, penninerved. *Flowers* minute, monoecious, in slender racemes, the ♂ 1—3 to each bract, the ♀ solitary or at the base of the raceme. *Calyx* of ♂ minute, membranous, unequally 5-lobed or -partite, of ♀ 3-lobed or -partite. *Petals* 0. *Disk* 0. *Stamens* 2—4; filaments short, free or nearly so; anther-cells distinct, contiguous, parallel. *Ovary* 3-celled; ovule 1 in each cell; styles free or connate at base, entire, revolute or spreading. *Fruit* a capsule of 3 cocci separating from a columella. *Seeds* oblong or subglobose, carunculate; testa smooth, albumen fleshy; cotyledons flat.

SEBASTIANIA CHANAELEA, Muell. Arg.; F. B. I. v. 475.

All plains Districts, a weed of cultivated land, and forest undergrowth.

A glabrous annual herb with linear leaves up to 3 in. long and a capsule with two rows of spines on the cocci.

56. *Excoecaria*, Linn.

Glabrous trees or shrubs with acrid milky juice. *Leaves* alternate or opposite, entire or subserrate. *Flowers* monoecious or dioecious, very small, in bracteate spikes or racemes, the ♂ 1—3 to each bract, 2-bracteolate, the ♀ at the base or in separate inflorescences; rhachis with large glands beneath or at the sides of the bracts. *Calyx* in ♂ of 3 small subequal lobes, in ♀ 3-lobed or -partite. *Petals* 0. *Disk* 0. *Stamens* 3, filaments free, anthers didymous, the cells parallel. *Ovary* 3-celled; ovule 1 in each cell; styles 3, stout, spreading or recurved. *Fruit* a capsule of 3 cocci separating from a columella, the valves crustaceous, twisting elastically. *Seeds* subglobose, not carunculate; testa crustaceous; albumen fleshy; cotyledons flat.

Leaves alternate, ovate-elliptic or orbicular, shortly acuminate, entire or sinuate-crenate, glabrous, up to 3 in. long, 2 in. broad; ♂ spikes very catkin-like, slender, up to 5 in. long, filaments long; capsule deeply lobed, 3 in. in diam., smooth

1. *Agollocha*.

Leaves opposite, serrate or crenulate; filaments short:—

Leaves chartaceous, lanceolate or oblanceolate, acuminate at both ends, up to 6 in. long, 1.5 in. broad, main nerves regular, 10—16 pairs; ♂ spikes slender, about 2 in. long, the bracteoles subulate; capsule deeply lobed, 5 in. in diam.

2. *crenulata*.

Leaves coriaceous, linear-oblong to oblong-lanceolate or -oblanceolate, abruptly acuminate, up to 10 in. long, 3 in. broad, main nerves regular, 15—20 pairs; ♂ spikes stout, 2—6 in. long, the bracteoles broadly ovate; capsules shallowly lobed, up to 1 in. in diam.

3. *robusta*.

1. EXCOECARIA AGALLOCHA, Linn.; F. B. I. v. 472; Wt. Ic. t. 1865 B.
Tidal forests and swamps on both coasts.
An evergreen tree with a poisonous milky juice. Bark grey, smooth, shining, with prominent lenticels; wood white, very soft, but apparently little used. Vern. *Hind.* Gangwa; *Tel.* Thilla; *Tam.* Tilai; *Mal.* Komatti.
2. EXCOECARIA CRENULATA, Wt. Ic. t. 1865; F. B. I. v. 473.
W. Ghâts, Nilgiris, Anamalais and hills of Travancore and Tinnevely, in Shola forests above 5,000 ft.
A small evergreen tree or shrub.
3. EXCOECARIA ROBUSTA, Hook. f.; F. B. I. v. 474.
W. Ghâts, Coorg, Nilgiris, Anamalais and hills of Travancore and Tinnevely; Kolimalai Hills of Trichinopoly; in evergreen forests at 2,000—5,000 ft.
A shrub with stout branches.

E. bicolor, Hassk., is a pretty shrub, common in gardens, having the under-surface of the leaves red.

57. Sapium, P. Br.

Trees or shrubs with milky juice. *Leaves* alternate, entire or toothed, penninerved; petiole often 2-glandular at top. *Flowers* monoecious, in terminal, simple or paniced, spikes or racemes; ♂ several to each bract, ♀ solitary, lower down or separate. *Petals* 0. *Disk* 0. *Stamens* 2—3; filaments free; anther-cells distinct, parallel. *Ovary* 2—3-celled; ovule 1 in each cell; styles free or connate at the base, spreading or recurved. *Fruit* a crustaceous fleshy or pulpy rarely woody capsule, at length loculicidally 3-valved. *Seeds* globose, not carunculate, usually long-persistent on the columella; testa crustaceous; alhumen fleshy; cotyledons flat.

Evergreen; ♂ and ♀ flowers on the same spike, the ♀ lowest, the styles long and slender; leaves lanceolate, acuminate, crenate-serrate, 3—5 in. long, 1—1.5 in. broad, main nerves very many and parallel; capsule large, depressed globose, 1—1.25 in. in diam., shining, very hard and woody.....1. *indicum*.
Deciduous; ♂ and ♀ flowers on separate spikes, the styles very short; leaves crowded at the ends of the branchlets, elliptic-ovate or obovate, acute, attenuate at base, crenate-serrate, 6—9 in. long, 3 in. broad, main nerves 12—20 pairs; capsule fleshy, 3 in. in diam., ovoid.....2. *insigne*.

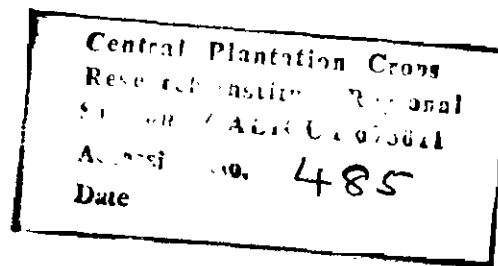
1. SAPIUM INDICUM, Willd.; F. B. I. v. 471; Wt. Ic. t. 1950.
West Coast, along backwaters in Malabar and Travancore. A small tree with acrid milky juice. Bark smooth, grey; wood white with small brown heartwood.
2. SAPIUM INSIGNE, Benth.; F. B. I. v. 471. *Falconeria malabarica*, Wt. Ic. t. 1866.
Deccan, hills of Kurnool, Cuddapah and Nellore, Kambakam Hill in Chingleput, W. Ghâts and W. Coast, usually in rocky places, up to 6,000 ft.
A deciduous tree, usually small, but sometimes of a fair size, the branchlets thick and fleshy, the juice acrid and poisonous. Bark grey, smooth, shining; wood white or grey, soft and spongy. Vern. *Hind.* Lendwa.

S. sebiferum, Roxb., is the Chinese Tallow tree, occasionally found in cultivation. It is the white wax round the seeds that can be used for candles.

Pedilanthus tithymaloides, Poit, is a fleshy American shrub with red or orange flowers, often found in gardens or planted as a hedge plant. *Cicca disticha*, Linn., is the Star Gooseberry, a small tree allied to *Emblica*, whose fruits are cooked and eaten or made into preserves. The chief tree grown in plantations to produce india-rubber is *Hevea braziliensis*, the Pará rubber tree of Brazil, while the less cultivated Ceará rubber is given by *Manihot Glaziovii*, Muell. Arg.

Manihot utilisima, Pohl, is the Cassava plant, occasionally cultivated for its tubers, which are edible, and from which also the starch known as Tapioca is prepared.

The common garden shrubs with curiously shaped and variegated leaves known as "Crotons" are species of the genus *Codiaeum*, especially *C. variegatum*, Linn., from the islands of the Pacific.



FLORA
OF THE
PRÉSIDENTY OF MADRAS

J. S. GAMBLE

VOL. III

BY

C. E. C. FISCHER

ULMACEAE TO GRAMINEAE, ADDENDA, AND INDEX.

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PREFACE TO REPRINTED EDITION

When the Botanical Survey of India was reorganised in 1954 the Government of India decided on the advice of the eminent Botanists of the country that the important Floras of the country which had gone out of print should be reprinted in order to provide immediate facilities of work on Systematic Botany of Phanerogams by students and Botanists of the country. The reprints are now being issued accordingly.

One particular point needs a special mention here. The Government of India, while recognising fully the need for bringing the Floras of the country upto date after a thorough revision, cannot overlook the fact that such work is possible only on an extensive and thorough exploration of both regions already explored and those hitherto unexplored and a proper rating of the information thus obtained with the materials in the already published Floras. For this reason alone, there is ample justification for a reprint of the old Floras; the present effort is therefore the starting point in the greater project of the review of the Flora of our country. It is hoped that these publications should thus meet the long-felt requirement of the Botanists of the country.

Owing to the necessity to conform to certain printing stipulations and using the same size of paper for all the reprinted Floras, the paginations in the reprinted volumes differ from the original. But the index, which is correspondingly corrected, would, it is hoped, enable reference without inconvenience.

The corrections mentioned in the corrigenda have been incorporated and some of the printing mistakes in the original flora have been corrected in this publication.

The reprint is being bound in three volumes as suggested in the original publication.

J. C. SEN GUPTA

Chief Botanist

Botanical Survey of India.

14, Madan Street,
Calcutta, 1957.



FLORA
OF THE
PRESIDENCY OF MADRAS

BY
C. E. C. FISCHER
LATE OF THE INDIAN FOREST DEPARTMENT

PART VIII
ULMACEAE TO XYRIDACEAE.

PUBLISHED UNDER THE AUTHORITY
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CALCUTTA

1956

polygamous, cymose, ♂ and ♀ usually at the base of the shoots, ♀ in upper axils. *Calyx*-lobes 4 or 5, imbricate. *Petals* 0. *Stamens* 4 or 5, inserted round a woolly torus. *Ovary* sessile; ovule pendulous; style-arms simple or lobed. *Fruit* a small ovoid or globose drupe; endocarp hard, smooth or rugose. *Seed* with membranous testa; albumen scanty or 0; embryo curved; cotyledons broad, inflexed flat or replicate, surrounding the upcurved radicle.

Leaves with one or more strong primary nerves above the basal ribs, membranous, very oblique, usually sharply serrate nearly to the base, acutely acuminate or caudate

1. *tetrandra*.

Leaves without strong primary nerves above the basal ribs:—

Twigs reddish-brown, lenticellate; mature leaves chartaceous or subcoriaceous, reticulations coarse, indistinct; pubescence ferruginous; sepals ciliate

2. *cinnamomea*.

Twigs grey-brown, not lenticellate; mature leaves rigidly coriaceous, reticulations fine, distinct; pubescence grey; sepals ciliate.....3. *Wightii*.

1. *CELTIS TETRANDRA*, Roxb.; F. B. I. v. 482. *C. serotina*, Planch. Wt. Ic. t. 1970.

All forest Districts from 2,500—7,500 ft. The Nilgiri Elm. A handsome medium-sized tree. Bark grey; wood greyish-white, not hard; not used in South India. Vern. Tel. Jabjabal; Tam. Kuviya; Bad. Aduva; Pul. Oma.

2. *CELTIS CINNAMOMEA*, Lindl.; F. B. I. v. 482. *C. trinervia*, Bedd. Fl. t. 312 (not of Roxb.).

All forest Districts from 500—4,500 ft.; common in dry forests and also at low elevations in evergreen forests; Rampa (Gamble).

A small tree. Bark pale green, covered with small lenticels; wood dull white with a small dark hard core, with a disgusting smell when freshly cut; not used except medicinally. Vern. Tel. Koti-bira, Yemika-bira, Kaki-mushti; Tam. Kalluviri, Pinar, Kodalimuriki; Mal. Butha.

3. *CELTIS WIGHTII*, Planch.; F. B. I. v. 483; Wt. Ic. t. 1969.

In the same localities as the last species; very similar to it and not easily distinguished from it. The same vernacular names apply.

3. *Gironniera*, Gaud.

Evergreen, unarmed trees or shrubs. *Leaves* alternate, penninerved, entire; stipules sheathing the buds, deciduous. *Flowers* dioecious, in axillary cymes or the ♀ solitary. *Perianth* simple, calycine, 5-partite, obtuse in ♂, narrower and acute in ♀. *Stamens* 5, filaments erect. *Pistillode* a tuft of hairs. *Ovary* glabrous; style central with 2 filiform, brown-tomentose arms. *Drupe* ovoid, slightly compressed, stoutly beaked, about 75 in. long including the beak. *Seed* subglobose; albumen 0, scanty or copious; embryo contorted.

GIRONNIERA RETICULATA, Thw.; F. B. I. v. 486; Bedd. Fl. t. 313.

E. and W. Ghats up to 3,000 ft. Coorg, Mysore (Meebold), hills of Vellore and Trichinopoly (Barber) and of Tinnevely and Travancore (Beddome). Not common.

A very large timber tree with buttressed base. Wood red-brown, hard, heavy, valuable for engineering (Beddome), planking, rafters, etc. Vern. *Tam. Koditani*.

4. *Trema*, Lour.

Small trees. *Leaves* alternate, serrate, oblique and 3-ribbed at the base; stipules lateral, caducous. *Flowers* dioecious, monoecious or polygamous, in axillary cymes. *Perianth* simple, calycine, 4—5-partite, induplicate-valvate or subimbricate, minute in the males. *Stamens* 4—5, erect in bud; pistillode small. *Ovary* sessile; style central with 2 linear arms. *Drupe* ovoid or subglobose, usually tipped by the style. *Seed* small, testa membranous; albumen fleshy; cotyledons narrow; radicle ascending.

TREMA ORIENTALIS, Bl.; F. B. I. v. 484. *Celtis orientalis*, L.; Wt. Ic. t. 602 and 603. *Sponia Wightii*, Planch.; Wt. Ic. t. 1971; Bedd. Fl. t. 311.

Common in all districts in dry and evergreen forests from near sea-level to 8,000 ft. The Charcoal Tree.

A small rapid-growing tree, quickly appearing in forest clearings. Bark greyish-brown with numerous lenticels; wood light reddish-grey, soft, excellent for charcoal for gun-powder, otherwise useless. The tree is useful for the rapid reclothing of cut-over areas and as a shade-plant. Vern. *Ur. Jivani*; *Tel. Gada-nelli*; *Tam. Ambaratthi*, Oman, Mudalei, Mini, Yerralai; *Mal. Ratthi*, Arni, Amathalai; *Kan. Gurklu*; *Bad. Womai*.

Family CXXXVII. CANNABINACEAE.

Shrubs or herbs, sometimes climbing, often aromatic. *Leaves* opposite and alternate, palmately nerved or palmately compound; stipules free, persistent. *Flowers* dioecious, axillary, males cymose or paniced, females in small cymes or heads with large bracts. *Perianth* inferior, 5-sepalous, imbricate in the males, reduced and entire in the females. *Stamens* 5, erect in bud. *Pistillode* 0. *Ovary* sessile, 1-celled, 1-ovuled; stigmas 2, large, feathery. *Fruit* an achene. *Seed* pendulous; embryo curved or spiral.

Cannabis, Tourn.

Erect herbs. *Leaves* usually opposite below and alternate above, upper palmately 3—1 foliate, passing into bracts, lower 3—8 foliate, serrate. ♂ *flowers* in short pendulous cymose panicles; ♀ crowded with leafy bracts, perianth 0 or hyaline. *Style* arms 2, filiform, caducous. *Achene* compressed, crustaceous. *Seed* flattened, albumen unilateral.

CANNABIS SATIVA, Linn.; F. B. I. v. 487.

Not indigenous but occasionally cultivated. Pulneys (Bourne). The Hemp Plant.

A large aromatic resinous herb. Not grown for its fibre in tropical regions but as the source of the drugs *Ganja* and *Bhang*.

Vern. *Hind.* Ganja, Bhang, Charas, Siddhi; *Tel.* Ganjari-chettu, Ganja-chettu, Bangi-aku; *Tam.* Ganja-chedi; *Mal.* Kancháva-chetti; *Kan.* Bhangigida.

Family CXXXVIII. MORACEAE.

Trees, shrubs or herbs, often with milky juice. *Leaves* usually alternate, rarely opposite, simple, frequently dotted (cystoliths); stipules deciduous, often sheathing and leaving an annular scar. *Flowers* small, monoecious or dioecious, usually cymose but sometimes becoming capitate or spiciform, the ♀ sometimes solitary. *Perianth* single, calycine, usually 4-merous, free or connate, often accrescent in fruit. *Stamens* isomeric and opposite the sepals or reduced in number. *Ovary* superior, 1-celled; styles 1 or 2, simple or 2-partite; ovule solitary, pendulous. *Fruit* an achene or drupe or sub-2-valvate, often aggregate into fleshy pseudocarps or anthocarps. *Embryo* usually curved; cotyledons often unequal, the larger enfolding the smaller.

Thorny trees or shrubs:—

Leaves more or less toothed; base narrowed, emarginate, upper surface minutely pustular; ♀ flowers solitary with accrescent, foliaceous sepals; fruit simple, ultimately valvate.....1. **Phyllochlamys**.

Leaves quite entire; base not emarginate, usually narrowed into the petiole, not pustular; ♀ flowers capitate, sepals connate into a fleshy head; fruit a fleshy anthocarp with several immersed achenes.....2. **Plecosperrum**.

Thornless trees, shrubs or herbs:—

Plants with milky juice:—

♂ flowers in pedunculate heads; stamens inflexed in bud, anthers reversed.....3. **Streblus**.

♂ flowers on the interior or exterior surface of a receptacle; stamens and anthers straight in bud:—

All the flowers crowded on the inner surface of a fleshy receptacle with a small mouth more or less completely closed by bracts.....4. **Ficus**.

♂ flowers crowded on the exterior surface of a fleshy receptacle:—

♂ flowers crowded on the upper surface of a disciform receptacle, ♀ solitary.....5. **Antiaris**.

All the flowers crowded around an oblong or globose receptacle

6. **Artocarpus**.

Plants with watery juice:—

Trees; flowers spicate or subcapitate; ♀ perianth fleshy.....**Morus**.

Herbs; flowers crowded on the upper surface of a flat receptacle; ♀ sunk in the receptacle.....7. **Dorstenia**.

1. **Phyllochlamys**, Bureau.

Thorny small trees or shrubs with milky juice. *Leaves* alternate, usually toothed, penninerved. *Flowers* dioecious, axillary, ♂ sessile in short bracteate spikes or heads; ♀ solitary, long-peduncled. *Perianth* of 3—4 sepals, imbricate, accrescent and foliaceous in ♀. *Stamens* 4. *Pistillode* dilated at the apex. *Ovary* 1-celled, 1-ovuled; style 2-partite. *Fruit* obliquely ovoid or globose, included in the persistent perianth; pericarp sub-fleshy below, thin above and finally 2-valved. *Seed* oblique, testa membranous; albumen 0; embryo large, subglobose, one cotyledon larger and enfolding the other.

PHYLLOCHLAMYS SPINOSA, Bur.; F. B. I. v. 488. *Epicarpurus spinosus*, Wt. Ic. 1962 (upper and right-hand figures).

Circars; Cuddapah (Beddome); Coromandel (Macé); Courtallam (Wight, Beddome); Travancore (M. Rama Rao). Not common.

A small evergreen gnarled tree or large shrub; spines terminating the branchlets, strong, sometimes leafy. Vern. *Tel.* Sukali.

2. *Plecosperrum*, Tréc.

Thorny small trees or shrubs with milky juice. *Leaves* quite entire, penninerved. *Flowers* dioecious, both sexes in axillary, 1—3-nate, pedunculate heads. *Perianths* of ♂ 4-lobed, concave, imbricate, of ♀ fleshy, 4-toothed, connate into a fleshy head. *Stamens* 4. *Pistillode* minute, hairy. *Ovary* straight, sunk deep in the fleshy head with the long, simple style protruding. *Fruit* an irregularly-shaped anthocarp enclosing a few coriaceous achenes adnate to the perianths. *Albumen* 0; embryo large, subglobose; one cotyledon larger, enfolding the other.

PLECOSPERMUM SPINOSUM, Tréc.; F. B. I. v. 491; Wt. Ic. t. 1963.

Common in the drier districts, and in the Nilgiri, Anamalai and N. Coimbatore Hills up to about 4,000 ft.

A large rambling shrub often climbing by means of its thorns, which are stout, long and straight or shorter and deflexed or slightly curved. Bark thin, orange-coloured; wood greyish-white with a small, very hard, bright orange-yellow heart-wood which gives a yellow dye. Vern. *Ur.* Bana-bana; *Tel.* Koriti, Kodiari, Daya-mulla; *Tam.* Achingudi, Daiyal; *Kan.* Bendaka.

3. *Streblus*, Lour.

Trees or shrubs with milky juice. *Leaves* alternate, penninerved or sub-3-ribbed, usually very scabrid; stipules small, ensiform. *Flowers* dioecious, rarely monoecious, axillary, ♂ in peduncled heads or spikes, ♀ solitary or 2—4 together, peduncled, bracteate at the base. *Perianth* of 4 imbricate sepals. *Stamens* 5. *Pistillode* dilated at the apex. *Ovary* straight, embraced by the sepals; style central with 2 very long arms. *Fruit* subglobose, pericarp thinly coriaceous, enclosed in the fleshy, persistent perianth. *Seed* globose; testa membranous; albumen 0; embryo globose, one cotyledon larger than and enfolding the other.

STREBLUS ASPER Lour.; F. B. I. v. 489. *Epicarporus orientalis*, Bl.; Wt. Ic. t. 1961.

Common in all but the wettest tracts up to about 2,000 ft.

A small, often gnarled, evergreen tree with usually small, wedge-shaped leaves. Bark soft, light grey, irregularly ribbed; wood white, moderately hard, tough and elastic; very difficult to cut and little employed. The rough leaves are used to polish ivory and wood. Vern. *Ur.* Sahada; *Tel.* Pakki; *Tam.* Pura, Pirasu; *Mal.* Pareukeu, Parava; *Kan.* Mitli, Punjai.

4. *Ficus*, Linn.

Trees and shrubs, sometimes scandent, often epiphytic in early life. Juice always more or less milky. *Leaves* alternate, rarely opposite, usually entire but sometimes toothed or lobed; stipules sheathing the

bud, caducous and leaving annular scars. *Flowers* minute, inserted on the inner walls of a fleshy receptacle with an apical mouth which is more or less completely closed by small imbricating bracts, of four kinds: ♂, ♀, gall and neuter, which may all occur in a species or one or both of the last two may be wanting; variously arranged in the same or separate receptacles, often mixed with scales or hairs; when androgynous the fewer ♂ are usually segregated near the mouth. *Perianth* of ♂ 2-fid or partite, imbricate, of ♀ as in the male or reduced. *Stamens* usually 1 or 2, rarely 3-6, erect in bud. *Ovary* straight or oblique; style excentric; ovule solitary, pendulous; *Gall-flowers* similar to ♀ but the ovary containing the larva or pupa of an insect; neuter perianth usually 3-fid, without trace of sexual organs. *Fruit* an achene or fleshy, small, included in the accrescent, fleshy syncarp. *Albumen* scanty; embryo curved, cotyledons equal or unequal.

Leaves all alternate:—

Leaves neither scabrid nor hispid above:—

Erect trees though often epiphytic at first:—

Leaves with not more than 16 pairs of primary nerves:—

Receptacles sessile (rarely shortly pedunculate in 6. *Tjakela*, 7. *insectoria*,

10. *Arnottiana*):—

Leaves not caudate:—

Leaves pubescent or tomentose below, at least when young:—

Leaves persistently grey-tomentose below with a gland at the base of the midrib (sometimes concealed by the tomentum), elliptic-ovate, obovate or subrotund; apex rounded or bluntly apiculate; base rounded, emarginate or cordate, 2-7.5 in. long, 1.5-5 in. broad, 3-7-ribbed; primary nerves 5-8 pairs; receptacles in axillary pairs, subglobose, tomentose, .25-.5 in. in diam.

1. *tomentosa*.

Leaves glabrescent, glandless:—

Leaves obtuse, elliptic to broadly ovate, base rounded, subcordate or slightly narrowed, 4-8.5 in. long, 2-5.5 in. broad, 3-7-ribbed, primary nerves 4-6 pairs; receptacles in axillary pairs, globose, puberulous, about .5 in. in diam. with 3 large rounded basal bracts, red when ripe.....2. *bengalensis*.

Leaves shortly abruptly acuminate, ovate to ovate-elliptic; base rounded, emarginate or cordate, 4-9.5 in. long, 2.5-6.5 in. broad, 3-5-ribbed; primary nerves 9-13 pairs, very prominent below, regular, parallel; receptacles in axillary pairs, oblong to subovate, about 1 in. long, nearly glabrous and orange-red when ripe

3. *mysorensis*.

Leaves glabrous:—

Petioles rarely over .5 in. long; leaves elliptic, ovate to obovate-rotund; apex rounded, slightly emarginate or bluntly apiculate; base narrowed, 1.5-4 in. long, .75-3 in. broad, 3-ribbed; primary nerves 5-6 pairs, appearing numerous because not much stronger than the secondary; receptacles in axillary pairs, depressed-globose, glabrous, about .3 in. in diam., yellowish or reddish when ripe

4. *retusa*.

Petioles 1 in. or more long:—

Basal bracts minute, scarious; leaves coriaceous, broadly ovate or ovate-lanceolate; apex acute or shortly bluntly cuspidate; base narrowed or rounded, 2-5.5 in. long, 1.3-3 in. broad; margin thick, cartilaginous, 3-ribbed; primary nerves 6-10 pairs (indistinct in fresh leaves), petioles 1.5-3 in. long; receptacles in axillary pairs, globose, about .5 in. in diam., smooth, purple when ripe.....5. *Tsiela*.

Basal bracts patent, not scarious:—

Receptacles 2—6 together on short tubercles in the axils of present or fallen leaves, basal bracts bifid; leaves coriaceous, very glossy above, oval or ovate; apex rounded, shortly abruptly acuminate; base rounded, rarely narrowed, 4—10 in. long, 1.75—5 in. broad, 3—5-ribbed, primary nerves 6—10 pairs, petioles 1.75—3 in. long; receptacles depressed-globose, .2 in. in diam., whitish-yellow and dotted when ripe, rarely very shortly peduncled.....6. *Tjakela*.
 Receptacles in axillary pairs, not on tubercles, basal bracts entire; leaves membranous, not or hardly glossy, ovate or oblong-ovate; apex rather abruptly shortly acuminate; base usually rounded, emarginate or subcordate, 3—6 in. long, 1.5—3.5 in. broad, 3-ribbed; primary nerves 5—7 pairs; petioles 1.1—2.75 in. long; receptacles globose, .25 in. in diam., whitish flushed with red and dotted when ripe.....7. *infectoria*.

Leaves caudate:—

Petioles 1.25 in. or less long; leaves narrowed at base, narrow-elliptic to broad-ovate; apex shortly, acutely caudate, 2—5 in. long, .5—2.5 in. broad, the caudicle up to .6 in. long and often curved, 3—5-ribbed, primary nerves 6—9 pairs, fairly prominent, petioles .5—1.25 in. long; receptacles in axillary pairs, obovoid, smooth up to .25 in. in diam.

8. *Talboti*.

Petioles 2 in. or more long; leaves broad at base:—

Cusp of leaf 1—3.5 in. long; base usually truncate; primary nerves usually 8 pairs; coriaceous, ovate-rotund; apex narrow and caudate; cusp linear or linear-lanceolate, often curved; base sometimes rounded, very rarely narrowed, up to 11 in. long including the cusp, up to 6.5 in. broad, 5—7-ribbed; margins usually strongly waved; petioles slender, 2—5 in. long; receptacles in axillary pairs, depressed globose, smooth, .5 in. in diam., with 3 broad, spreading basal bracts, dark purple when ripe.....9. *religiosa*.
 Cusp of leaf .5—1 in. long; base usually deeply cordate; primary nerves 5—7 pairs, broadly ovate; apex finely caudate; base seldom emarginate or truncate, never narrowed, up to 9 in. long, 3.5 in. broad, 7-ribbed; margins subundulate; petioles 2—3.5 in. long; receptacles sessile or very shortly peduncled in pairs or clusters on tubercles usually in the axils of fallen leaves, depressed-globose, .25—.5 in. in diam., purple with greenish dots when ripe

10. *Arnottiana*.

Receptacles distinctly peduncled:—

Receptacles axillary on the twigs:—

Petioles less than 1 in. long; leaves elliptic to oblanceolate; apex narrowed or rounded and narrowly, acutely caudate; base narrowed, rarely rounded, slightly inequilateral, 2.5—6.5 in. long, 1—2.75 in. broad, the cusp up to .6 in. long, 3—5-ribbed; primary nerves 5—10 pairs; receptacles in pairs, without basal bracts, sub-globose, smooth or slightly verrucose, glabrous, .25—1 in. in diam., peduncle up to .6 in. long.....11. *nervosa*.

Petioles more than 1 in. long:—

Receptacles solitary; leaves more or less scabrid below, rigid, coriaceous, elliptic to broad-ovate; apex rounded or shortly bluntly acuminate; base broad, rounded (rarely narrowed, and then the leaf is nearly obovate), 4—9 in. long, 3—4.5 in. broad, 3—5-ribbed; primary nerves 5—12 pairs; margins slightly recurved; petioles 1—2.5 in. long; receptacles pubescent-scabrid, subglobose, narrowed into a short stalk, about 1 in. in diam., with 3 broad-ovate basal bracts, yellow when ripe; peduncles about .8 in. long.....12. *callosa*.

Receptacles twin; leaves not at all scabrid:—

Leaves minutely white-pubescent below, ovate-elliptic to broad-ovate; apex acute or acuminate; base more or less deeply cordate, up to 12 in. long and 9 in. broad, 3—7-ribbed; primary nerves 10—13 pairs, prominent below; petioles up to 4 in. long; receptacles

obovoid, pubescent, about .5 in. in diam., with 3 broadly triangular, densely hairy, sometimes bifid, spreading basal bracts

13. *Dalhousiae*.

Leaves glabrous below:—

Basal bracts 3, free or connate at base, persistent; leaves ovate, abruptly acuminate; base broad, truncate to slightly emarginate, or sometimes rounded and then suddenly contracted into the petiole, 6—12 in. long, 3—5 in. broad, 3-ribbed; primary nerves about 12 pairs, nearly horizontal; margin somewhat sinuate; petioles stout, 2—4.5 in. long; receptacles ovoid or slightly obovoid with several vertical ridges; umbilicus prominent, 1 in. long; peduncles stout, .2—75 in. long.....14. *Beddomei*.

Basal bracts 2, connate at base, caducous, leaving an annulus; leaves coriaceous, brownish below, elliptic-lanceolate to broadly elliptic; apex narrowed, obtuse; base narrowed, 3.5—5 in. long, 1.75—2.75 in. broad, 3-ribbed; primary nerves about 15 pairs; petioles stout, 2—3.5 in. long; receptacles subglobose, somewhat ribbed, dotted, about .6 in. long; peduncles stout, .5—75 in. long.....15. *Angladei*.

Receptacles on short, leafless branchlets from the main stem or larger branches:—

Leaves entire, elliptic-lanceolate, ovate or obovate-oblong, sometimes slightly inequilateral; apex narrowed, blunt or acute; base narrowed, obtuse or acute, glabrous, 2.75—6 in. long, 1.5—2.5 in. broad, 3-ribbed; primary nerves 4—8 pairs; secondary nerves irregular and indistinct; petioles .3—1.75 in. long; receptacles on scariously bracteolate, tubercled and warted branchlets, subglobose, smooth, about 1.25 in. in diam., reddish when ripe; peduncles up to .75 in. long...16. *glomerata*. Leaves coarsely, remotely toothed, lanceolate or ovate to broadly elliptic, apex acute or acuminate; base subcuneate, rounded or emarginate, never cordate, puberulous on the nerves below, eventually glabrous above, minutely papillose below, 5—9 in. long, 3—4.5 in. broad, 3—5-ribbed; primary nerves 4—8 pairs; secondary nerves subregular, transverse between the primaries, distinct below; petioles 1.5—3.5 in. long; receptacles on tubercles on leafless branchlets, subglobose or pear-shaped, 1 in. or a little more in diam., reddish when ripe; peduncles 1—2.5 in. long.....17. *pomifera*.

Leaves with very many primary nerves:—

Receptacles over .5 in. in diam.; leaves elliptic to broadly ovate-elliptic, shortly abruptly acuminate or shortly caudate; base rounded or subacute, 2—4.5 in. long, .5—2 in. broad, indistinctly 3-ribbed; petioles .4—1 in. long; receptacles sessile in axillary pairs, globose, about .75 in. in diam.

18. *comosa*.

Receptacles less than .5 in. in diam.:—

Petioles 1—2.5 in. long; stipule single, subpersistent, about half the length of the leaf; leaves thick, leathery, oblong-elliptic, with a short abrupt caudicle; base rounded or narrowed, 3—12 in. long, 1.5—5.5 in. broad; 3—5-ribbed; midrib prominent, thick; receptacles sessile in axillary pairs, ovate-oblong, smooth, about .5 in. long, greenish-yellow when ripe.....*elastica*.

Petioles .4—1 in. long; stipules deciduous, about .5 in. long; leaves thinly coriaceous, ovate-elliptic, bluntly acuminate; base rounded or subacute, 2—4.5 in. long, 1—2 in. broad, 3-ribbed; receptacles sessile in axillary pairs, globose or ovoid, smooth, about .33 in. in diam., blood-red when ripe.....*Benjamina*.

Scandent shrubs:—

Leaves lanceolate; apex acuminate, base acute, 4.5—8 in. long, 1.5—2.5 in. broad, 3-ribbed, primary nerves 10—12 pairs, margins subundulate, petioles .5—1 in. long; receptacles in axillary pairs, globose, glabrous, .25—5 in. in diam.; basal bracts 3, deciduous, peduncles about .25 in. long

19. *travancorica*.

Leaves broadly ovate:—

Twigs nearly glabrous; leaves membranous, broadly ovate, sometimes inequilateral; apex shortly acuminate; base rounded or very shallowly cordate, pubescent or subglabrous below, 4—7 in. long, 2·5—4·5 in. broad, 3—5-ribbed; primary nerves 3—4 pairs; petiole glabrescent, 75—2·5 in. long; receptacles fascicled on the naked branches below the leaves, globose, pubescent or nearly glabrous, 1—2·5 in. in diam., without basal bracts, spotted when ripe; peduncles about 33 in. long, with several bracteoles at the base.....20. *macrocarpa*.

Twigs tomentose; leaves subcoriaceous, broadly ovate to rotund-ovate; apex usually shortly, abruptly caudate, base usually shallowly cordate, usually thinly tomentose below, 3·75—6·75 in. long, 2·5—5 in. broad, 3—5-ribbed; primary nerves 3—4 pairs; petioles rusty-tomentose, 75—2 in. long; receptacles in fascicles on tubercles on the branches or stem, subglobose, pubescent, 1—2 in. in diam., blotched; basal bracts 3, broadly ovate, caducous; peduncles stout, rusty-tomentose, up to 5 in. long

21. *guttata*.

Leaves more or less scabrid or hispid above (smooth in var. *cuspidifera* of 22. *gibbosa*):—

Leaves not semi-sagittate:—

Leaves acute or cuneate at base, very rarely rounded, usually inequilateral with one side more or less gibbous, elliptic-ovate to lanceolate or oblanceolate, very rarely nearly orbicular; apex obtuse, acute or cuspidate, minutely hispid below (glabrous on both sides in var. *cuspidifera*), 1·5—5·5 in. long; 6—3 in. broad, 3-ribbed; primary nerves 3—7 pairs; receptacles shortly peduncled in pairs or fascicled on the twigs, subglobose, scabrid, 2—3 in. in diam., yellow when ripe.....22. *gibbosa*.

Leaves not acute or cuneate at base:—

Weak shrubs, often creeping; leafy twigs pithy and more or less hollow; leaves very variable, entire or 2-many-lobed, outline from narrow-lanceolate to rotund-ovate; apex rounded or more or less acuminate, base rounded or cordate; both surfaces scabrous or the lower (sometimes the upper also), tomentose, 2—6·5 in. long, 5—2·5 in. broad, 3—5-ribbed; primary nerves 4—8 pairs, margins irregularly and coarsely toothed or repand; receptacles axillary, solitary, rarely twin, globose to elongate pear-shaped, umbilicus always prominent, more or less scabrid-hispid, 5—1 in. long, dark-orange when ripe; peduncles 5—1 in. long

23. *heterophylla*.

Erect shrubs or small trees; twigs soon woody and solid:—

All parts very scabrid; leaves elliptic, ovate or obovate, rarely 3—5-lobed, often inequilateral; apex rounded or acuminate; base rounded, rarely narrowed; upper surface with short, stiff hairs from bulbous bases, 2·5—7·5 in. long, 1·25—3·25 in. broad, 3-ribbed; primary nerves 3—5 pairs, prominent below, as are the ultimate reticulations; petioles 5—3·5 in. long; receptacles axillary, solitary, globose with a prominent umbilicus, scabrous-hispid, 5—75 in. in diam., yellow or purple with yellowish dots when ripe; peduncles 2—4 in. long

24. *asperima*.

Shoots softly tomentose; leaves subscabrid-tomentose, orbicular-ovate, entire or obtusely 3—5-lobed, acute or apiculate, 1·5—5 in. in diam., 3-ribbed; primary nerves 3—6 pairs; petiole 1—2 in. long; receptacles axillary, solitary, subglobose to pyriform; base constricted, 5—1 in. in diam., yellow when ripe; peduncles 5—1 in. long.....25. *palmata*.

Leaves semi-sagittate, one side with a large 3—4-ribbed lobe, the other cuneate or with a small 1—2-ribbed lobe, elliptic to oblong-lanceolate; apex acuminate, 4—9 in. long, 1·5—3·5 in. broad; primary nerves 9—14 pairs; petioles scabrid, 2—6 in. long; receptacles shortly peduncled in pairs on usually leafless branchlets from the stem or larger branches, globose or pear-shaped, warted, hispid, often bearing irregular bracts on the sides, 4—7 in. in diam., reddish-brown when ripe.....26. *unia*.

Leaves opposite, very rarely alternate, membranous, elliptic-ovate, oblong, obovate or obovate-oblong; sometimes inequilateral; apex acute, acuminate or cuspidate; base cuneate, rounded or emarginate, both surfaces hispid-pubescent, up to 14 in.

long and 6 in. broad, 3—5-ribbed; primary nerves 5—6 pairs, some at least branching about halfway to the margin; secondary nerves regular and straight, petioles .5—2.5 in. long; receptacles fascicled on the stem or leafy branchlets, obovoid or turbinate, sometimes with scattered bracts on the sides, hispid, .5—1 in. in diam., yellowish when ripe; peduncles up to .6 in. long.....27. *hispida*.

1. *FICUS TOMENTOSA*, Roxb.; F. B. I. v. 501; King Ann. Calc. i. t. 18 and 81g; Wt. Ic. t. 647.

In all districts from sea-level to 5,000 ft., usually in dry rocky places. Rampa Hills (Narayanswami).

A small or fairly large tree throwing out small aërial roots from the branches; often epiphytic. Bark greenish-white; wood white, useless. Vern. *Tel.* Jivi, Juvi, Kaljuvi; *Tam.* Ichchi, Kal-ichchi; *Mal.* Kal-al; *Kan.* Kallatti.

2. *FICUS BENGALENSIS*, Linn.; F. B. I. v. 499; King Ann. Calc. i. t. 13 and 81c. *Urostigma bengalense* Gasp.; Wt. Ic. t. 1989.

In all districts from sea-level to 4,000 ft. in deciduous and semi-evergreen forest. Much planted in avenues and for shade, for which purposes it is admirably suited. The Banyan.

A very large tree throwing out numerous large aërial roots from the main trunk and large branches, which descend to the soil and form supports, and are then capable of separate existence when severed from the parent tree. Held in reverence by the Hindus. Bark greyish-white; wood greyish-white, moderately hard, without heartwood, durable under water and used for well-curbs, also for tent and yoke poles. Vern. *Hind.* Bor, Bar, Ber; *Ur.* Boru; *Tel.* Mari, Pedda-mari; *Tam.* and *Mal.* Ala, Per-al; *Kan.* Alada.

3. *FICUS MYSORENSIS*, Heyne; F. B. I. v. 500; King Ann. Calc. i. t. 14 and 81d.

From Central Mysore southwards in moderately wet forests from 500—3,500 ft. Saklaspur (Barber, Meebold), Attapadi Valley (Fischer), Pulneys (Rodriguez).

A large, handsome, shady tree with few aërial roots; occasionally epiphytic. Sometimes planted in avenues. Wood soft, useless. Vern. *Tam.* Kal-ala, Sonnai-ala; *Kan.* Goni-mara.

Var. *pubescens*, Roth, has smaller leaves with fewer primary nerves, denser tomentum, which is a deep ferruginous red on the younger parts. In the same localities as the type but less frequent.

4. *FICUS RETUSA*, Linn.; F. B. I. v. 511; King Ann. Calc. i. t. 61 and 84p.

In all districts from sea-level to about 4,000 ft. Sometimes planted in avenues. Rampa Hills (V. Narayanswami), Ganjam (Barber).

A large, evergreen tree with few aërial roots; sometimes epiphytic. Bark brown, fairly smooth; wood light reddish-grey, moderately hard, one of the best of the fig woods. Vern. *Tel.* Juvi, Konda-juvi, Yerra-juvi; *Tam.* Pon-ichchi, Kal-ichchi, Kal-atthi; *Mal.* Itival; *Kan.* Pilala, Kirugoli.

Var. *nitida*, Thunb.; F. B. I. v. 511; King Ann. Calc. i. t. 62; *Ficus nitida*, Roxb.; Wt. Ic. t. 642, is a similar tree with the leaves narrowed at the base. The range of the type.

5. *FICUS TSIELA*, Roxb. ; F. B. I. v. 515 ; King Ann. Calc. i. t. 73, 74 and 84z2 ; Wt. Ic. t. 668 ; Bedd. Fl. t. 314.

From Kurnool southwards, in deciduous and evergreen forests from 1,000—3,500 ft. Frequently planted in avenues, and for shade.

A large, spreading tree with few or no aerial roots ; often epiphytic. Bark greenish-grey, smooth ; wood grey, soft to moderately hard. Vern. *Ur.* Jori ; *Tel.* Pedda-juvi ; *Tam.* Kal-ichchi ; *Mal.* Kirgali ; *Kan.* Billibasari.

6. *FICUS TJAKELA*, Burm. ; F. B. I. v. 514 ; King Ann. Calc. i. t. 70 and 84x.

In the forests of the West Coast from sea-level to about 4,000 ft., extending to the Javadi Hills (Barber). Sometimes planted as a shade tree in coffee plantations.

A very tall tree without aerial roots. Bark dark-brown, rather rough ; wood brown, soft. Vern. *Mal.* Kar-al ; *Kan.* Karibasari.

7. *FICUS INFECTORIA*, Roxb. ; F. B. I. v. 515 ; King Ann. Calc. i. t. 75 and 84y2 ; Wt. Ic. t. 665.

In all districts from near sea-level to 7,000 ft. Not common wild, but frequently planted near and in villages.

A large deciduous tree without aerial roots ; frequently epiphytic. Bark greenish-grey, smooth ; wood grey, moderately hard. Vern. *Hind.* Pakri ; *Ur.* Pakodo ; *Tel.* Jati, juvi ; *Tam.* Malai-ichchi ; *Mal.* Cherla ; *Kan.* Basari.

Var. *Lambertiana*, Miq. ; F. B. I. v. 516 ; King Ann. Calc. i. t. 76, has leaves with bases broad, rounded, emarginate or subcordate, rarely narrowed ; receptacles 3—4 in. in diam. on pubescent peduncles 2—3 in. long.

Var. *Wightiana*, Wall. ; F. B. I. v. 516 ; King Ann. Calc. i. t. 77, has smaller leaves narrowed at the base ; receptacles large in proportion to the leaves, on glabrous or pubescent peduncles about 2 in. long.

8. *FICUS TALBOTI*, King Ann. Calc. i. 51, t. 63 and 84q ; F. B. I. v. 512.

In the evergreen forests of the W. Ghâts from 500—4,500 ft. Not common.

A large, evergreen tree with few or no aerial roots ; usually epiphytic in youth. Bark green, very smooth ; wood very white when fresh, turning yellow ; useless. Vern. *Tam.* Itthi, Kal-ithi.

9. *FICUS RELIGIOSA*, Linn. ; F. B. I. v. 513 ; King Ann. Calc. i. t. 67a and 84u ; Bedd. Fl. t. 314. *Urostigma religiosum*, Gasp. ; Wt. Ic. t. 1967.

Not wild in Southern India, except, possibly, in the North East bordering on the Central Provinces, but widely planted on village sites and in avenues. The Pipul Tree.

A large tree with few or no aerial roots ; often epiphytic. Venerated by the Hindus. Bark grey, smooth ; wood whitish, moderately hard, used for packing-cases. Vern. *Hind.* Pipal ; *Ur.* Jori, Usto ; *Tel.* Rai, Ragi, Ravi ; *Tam.* Arasa, Arasu ; *Mal.* Arasu, Arei-al ; *Kan.* Arali.

10. *FICUS ARNOTTIANA*, Miq. ; F. B. I. v. 513 ; King Ann. Calc. i. t. 68 and 84v.

In all districts in rocky places in the hills, up to 4,500 ft.

A small tree or large shrub without aerial roots. Bark pale, smooth; wood white, useless. Vern. *Tel.* Kondaravi; *Tam.* Kal-arasu; *Mal.* Ama-kannian; *Kan.* Kadarasai.

Var. *courtallensis*, King Ann. Calc. i. 56, t. 68b; F. B. I. v. 514, with smaller and less cordate leaves.

11. *FICUS NERVOSA*, Roth; F. B. I. v. 512; King Ann. Calc. i. t. 65. *Ficus angustifolia*, Roxb.; Wt. Ic. t. 660.

In the hills of most districts except the driest, from 200—4,500 ft. Rampa Hills (Gamble), Vizagapatam Hills (A. W. Lushington). Usually found near streams.

A moderate-sized to large tree. Bark brown mottled white; wood white, soft. Vern. *Tam.* Nir-al; *Mal.* Eechamaram.

Var. *minor*, King, with all parts smaller and more puberulous. Nilgiri Hills (Gamble).

12. *FICUS CALLOSA*, Willd.; F. B. I. v. 516; King Ann. Calc. i. t. 84v2 and 85.

In evergreen and secondary forests in the W. Gháts from sea-level to 2,500 ft.

A large tree with verrucose, canescent twigs. Bark grey, smooth; wood white, useless. Vern. *Tam.* Koli-al.

13. *FICUS DALHOUSIAE*, Miq.; F. B. I. v. 499; King Ann. Calc. i. t. 11 and 81a.

In hill forests from Cuddapah southwards from near sea-level to 4,500 ft.

A small tree usually growing in rocky ravines. Vern. *Tam.* Pei-al, Kal-al; *Mal.* Kalalai.

14. *FICUS BEDDOMEI*, King Ann. Calc. i. 26, t. 24 and 81m; F. B. I. v. 502.

In the evergreen forests of the W. Gháts from 1,000—5,000 ft. Nilgiris (Gamble), Anamalais (Barber, Fischer), Travancore (Bourdillon), Tinnevely (Beddome).

A large tree, often epiphytic in youth. Bark pale-brown, smooth; wood white, useless. Vern. *Mal.* Thavatta-al.

15. *FICUS ANGLADEI*, C. Fischer in Kew Bull. 1925, 332.

In the lower Pulney Hills at about 2,700 ft. (Anglade, Saulière). A tree.

16. *FICUS GLOMERATA*, Roxb. Cor. Pl. ii, t. 123; F. B. I. v. 535; King Ann. Calc. i. t. 218a; Wt. Ic. t. 667; Brand. For. Fl. t. 49.

Common in all districts from sea-level to about 6,000 ft. in evergreen forests, and near streams in deciduous forests.

A large, deciduous tree with few and short aerial roots. Bark grey- to reddish-brown; wood greyish-brown, soft. Vern. *Ur.* Dimiri; *Tel.* Atti; *Tam.* Atthi; *Mal.* Atthi, Atthi-al; *Kan.* Atti.

17. *FICUS POMIFERA*, Wall.; F. B. I. v. 535; King Ann. Calc. i. t. 215.

Rampa Hills in the Godavari District at 2,000 ft. (Gamble). Not hitherto found elsewhere in Southern India.

A medium-sized tree. Bark grey; wood soft, spongy.

18. *FICUS COMOSA*, Roxb. Cor. Pl. ii, t. 125; Wt. Ic. t. 658. *Ficus Benjamina*, Linn., var. *comosa*, Kurz; F. B. I. v. 508; King Ann. Calc. i. t. 52b.

Vantala in the Vizagapatam Hills at 4,000 ft. (A. W. Lushington). Not found wild, hitherto, elsewhere in Southern India, but sometimes planted.

A large, handsome tree. Bark grey, smooth; wood grey, moderately hard.

19. *FICUS TRAVANCORICA*, King Ann. Calc. i. 28, t. 26 and 82o; F. B. I. v. 503.

In the hill tracts of N. Travancore and the Anamalais (Barber), in the Coimbatore District from 3,000—5,000 ft., in evergreen forest.

A straggling or scandent shrub (middle-sized tree, *fide* Meebold).

20. *FICUS MACROCARPA*, Wight; F. B. I. v. 534; King Ann. Calc. i. t. 208. *Pogonotrophe macrocarpa*, Miq.; Wt. Ic. t. 1965.

In the evergreen forests of the Nilgiri and Pulney Hills from 4,000—5,000 ft.

A scandent shrub.

21. *FICUS GUTTATA*, Kurz; F. B. I. v. 534; King Ann. Calc. i. t. 209. *Covellia guttata*, Wt. Ic. t. 1966.

In evergreen forest in the W. Gháts from 3,500—7,200 ft.

A scandent shrub, often creeping over rocks. Very like the last.

22. *FICUS GIBBOSA*, Bl., var. *PARASITICA*, Koen.; F. B. I. v. 497; King Ann. Calc. i. t. 2ba. *Ficus ampelos*, Roxb.; Wt. Ic. t. 652.

Common in all districts from sea-level to about 6,000 ft.

A fair-sized tree; usually epiphytic at first, often embracing other trees, and eventually completely surrounding and killing them. Bark greyish- or yellowish-green; wood brownish-grey, soft, useless. Vern. *Ur.* Korotosani; *Tel.* Konda-juvi, Pakki; *Tam.* Kal-itthi, Kal-perukam; *Mal.* Itthi, Kal-itthi; *Kan.* God-dumtite.

Var. *cuspidifera*, Miq.; King Ann. Calc. i. t. 2a, with the leaves elongate and gradually narrowed to the apex; less scabrid, sometimes quite smooth on both surfaces. Range of the type.

Var. *tuberculata*, Roxb.; King Ann. Calc. i. t. 2bb. *Ficus tuberculata*, Roxb.; Wt. Ic. t. 651; with narrower leaves which are sometimes irregularly serrate. Rare.

23. *FICUS HETEROPHYLLA*, Linn. f.; F. B. I. v. 518; King Ann. Calc. i. t. 94. *Ficus repens*, Roxb.; Wt. Ic. t. 636. *Ficus scabrella*, Roxb.; Wt. Ic. t. 661.

In all districts from sea-level to about 3,000 ft., usually near water.

A weak, very variable shrub, creeping or erect. Vern. *Ur.* Gonthi-sahada; *Tel.* Buroni; *Tam.* Kodi-atthi.

24. *FICUS ASPERRIMA*, Roxb.; F. B. I. v. 522; King Ann. Calc. i. t. 100; Wt. Ic. t. 633.

In all hilly tracts up to 4,500 ft., and down to sea-level on the West Coast. The Sand-paper Tree.

A small or medium-sized tree without aerial roots. Bark pale,

smooth; wood whitish, soft, useless; leaves used as sand-paper in sandalwood carving. Vern. *Ur.* Korotosano; *Tel.* Karakaboddu; *Tam.* Irambarattam, Maramthinni-Atthi; *Mal.* Theragam; *Kan.* Garagatti.

25. *FICUS PALMATA*, Forsk.; F. B. I. v. 530; King Ann. Calc. i. t. 185. *Ficus virgata*, Roxb.; Wt. Ic. t. 649.

Simli in the Vizagapatam Hills at 3,000 ft. (A. W. Lushington); not reported from elsewhere in Southern India.

A bush or small tree. Bark grey, smooth; wood white, even-grained, moderately hard.

26. *FICUS CUNIA*, Ham.; F. B. I. v. 523; King Ann. Calc. i. t. 126; Wt. Ic. t. 648; *Ficus conglomerata*, Roxb.; Wt. Ic. t. 669.

In the hills of the Godavari and Ganjam Districts (Barber). Rare.

A small or medium-sized tree without aerial roots; the leaves are very distinctive. Bark thick, reddish-brown, rough; wood greyish-brown, moderately hard, useless. Vern. *Ur.* Godima; *Tel.* Bommamari.

27. *FICUS HISPIDA*, Linn. f.; F. B. I. v. 522; King Ann. Calc. i. t. 154 and 155. *Ficus oppositifolia*, Roxb. Cor. Pl. ii. t. 124; Wt. Ic. t. 638. *Ficus daemonum*, Koen.; Wt. Ic. t. 641.

Common in all districts in evergreen forests and elsewhere in damp localities from sea-level to about 4,000 ft.

A small, weak tree, generally with hollow internodes, all parts very hispid; without aerial roots. Bark grey, rough; wood dirty-grey, soft, useless. Vern. *Hind.* Kagsha; *Ur.* Bhai-dimiri; *Tel.* Brammadi, Boddamari, Bemmadu, Bommamedu; *Tam.* Pei-atthi, Chona-atthi, Pollaparakam; *Mal.* Erumanakku, Parakam; *Kan.* Kad-Atthi.

- Ficus elastica*, Roxb.; F. B. I. v. 508; King Ann. Calc. i. t. 54; Wt. Ic. t. 663.

A large tree occasionally planted. The sap yields indian-rubber. The Rubber Fig.

- Ficus Benjamina*, Linn.; F. B. I. v. 508; King Ann. Calc. i. t. 52a and 83h.

A large, handsome tree with numerous aerial roots. Often planted in avenues and as an ornamental tree. The Java Fig.

Ficus pumila, Linn.; King Ann. Calc. i. t. 158, is a scandent or creeping shrub with dimorphic leaves, grown ornamentally on walls.

5. *Antiaris*, Leschen.

Gigantic trees. *Leaves* alternate, bifarious, penninerved; stipules small, connate, caducous. *Flowers* monoecious; ♂ crowded on the surface of an axillary, pedunculate receptacle, surrounded by confluent, imbricating bracts, with 3—4 spathulate, imbricate sepals; ♀ minute, solitary in an involucre of many confluent bracts, without perianth. *Stamens* 3—8. *Pistillode* 0. *Ovary* adnate to the involucre; ovule pendulous; style-arms 2, subulate, recurved. *Fruit* fleshy, the pericarp confluent with the receptacle. *Seed* exalbuminous, testa hard; embryo subglobose; cotyledons equal; radicle small, superior.

ANTIARIS TOXICARIA, Leschen.; F. B. I. v. 537. *A. saccidora*, Dalz.; Wt. Ic. t. 1958. *A. innoxia*, Bl.; Bedd. Fl. t. 307.

Evergreen forests of the West Coast up to 2,000 ft. The Upas Tree.

The largest tree of South India, attaining 250 ft. in height (Beddome). Bark brownish-grey, smooth, inner bark fibrous, making good cordage and also used in sections for making into sacks; wood white, soft, perishable. The milky juice is poisonous, but not so virulent in the Indian examples as in the Malayan. Vern. *Tam.* Aranthelli, Mara-uri; *Mal.* Arei-anjili, Aranjelli.

6. *Artocarpus*, Forst.

Trees. *Leaves* alternate, coriaceous, entire, lobed or pinnatifid, penninerved. *Flowers* monoecious, crowded on globose, oblong or cylindrical, solitary, usually axillary receptacles. *Perianth* in ♂ 2—4-lobed or -partite, in ♀ tubular and confluent below with the receptacle. *Stamen* 1. *Pistillode* 0. *Ovary* straight; ovule pendulous; style exserted; stigma undivided. *Fruit* a large, fleshy, globose or oblong receptacle covered with the enlarged fleshy anthocarps, which are smooth, tubercled or spiny according as they are completely or partially connate and have flat or attenuate apices. *Seed* with a membranous testa; exalbuminous; embryo straight or incurved; cotyledons fleshy, equal or unequal; radicle short, superior.

Quite glabrous; leaves oblong to obovate-oblong, base acute, entire (of young plants occasionally 3-lobed), dark-green and glossy above; lateral nerves 7—8 pairs, 4.5—7 in. long, 2—3.5 in. wide; stipules 2—3 in. long, spathaceous; fruit tubercled, oblong or cylindric, 12—24 in. long.....1. *integrifolia*.

Branchlets, leaves below and stipules pubescent or hairy; leaves not acute at base, entire (of young plants often more or less pinnatifid), not dark green nor glossy above; lateral nerves 8—12 pairs; stipules not spathaceous:—

Evergreen; young parts strigose with tawny hairs; leaves broadly ovate, obovate or elliptic, subacute or very shortly acuminate, base rounded or somewhat narrowed; tawny hairy on the midrib above and the nerves below, 5—12 in. long, 3—6 in. wide; stipules yellow-hairy; fruit spinous, oblong or cylindrical, 2—3 in. long.....2. *hirsuta*.

Deciduous; young parts densely grey- or rusty-tomentose; leaves ovate or oblong, shortly, finely acuminate or cuspidate; base truncate or subcordate, densely grey-downy below and on the midrib above, 4—12 in. long, 2—8 in. wide; stipules small, grey-pubescent; fruit smooth, globose, 2—3 in. in diam

3. *Lakoocha*.

1. *ARTOCARPUS INTEGRIFOLIA*, Linn.; F. B. I. v. 541; Wt. Ic. t. 678; Roxb. Cor. Pl. t. 250.

Evergreen forests of the W. Gháts from 1,500—4,000 ft.; cultivated nearly everywhere. The Jack Tree.

A large evergreen tree. Bark black mottled green, smooth (deeply cleft when old); sapwood pale, heartwood bright yellow, darkening on exposure, moderately hard, does not warp or split, easily worked, used for carpentry. Vern. *Hind.* Kanthal; *Úr.* and *Tel.* Panása; *Tam.* and *Mal.* Pila, Pilavu; *Kan.* Alasa.

2. *ARTOCARPUS HIRSUTA*, Lamk.; F. B. I. v. 541; Wt. Ic. t. 1957; Bedd. Fl. t. 308; King Ann. Calc. ii. t. 5.

Evergreen forests of the West Coast from sea-level to 3,500 ft.; Coorg, Mysore (Meebold), Wynad, Anamalais to Travancore. A very large evergreen tree. Bark grey, smooth; sapwood white; heartwood yellowish-brown, moderately hard, durable; seasons and polishes well, does not warp nor crack, not eaten by white ants; valuable for panelling, flooring and boat-building. Vern. *Tam.* Anjili, Pepla, Katupila, Tellai-kori mara; *Mal.* Aini, Ayani; *Kan.* Halasu.

3. *ARTOCARPUS LAKOOCHA*, Roxb.; F. B. I. v. 543; Wt. Ic. t. 681; King Ann. Calc. ii. t. 13.

Hill forests up to 3,500 ft.; Coorg, Mysore, West Coast, Ganjam (Gamble), Vizagapatam Hills (A. W. Lushington).

A large deciduous tree. Bark rough, dark-grey or purplish; sapwood large, white, soft and perishable; heartwood yellowish-brown, fairly hard, not eaten by white ants, used for house- and boat-building. Fruit edible, sometimes cultivated for that reason; wood and fruit yield a yellow dye. Vern. *Hind.* Dahu, Lakuch; *Tel.* Nakkarenu; *Mal.* Chima, Thitti-pilavu; *Kan.* Wonta.

7. *Dorstenia*, Linn.

Herbs or small shrubs. *Leaves* alternate or radical, entire or lobed; stipules lateral. *Flowers* monoecious, crowded on a flat, simple or lobed receptacle. *Perianth* of ♂ more or less connate and adnate to the receptacle, obscurely 2-lobed or toothed, of ♀ deeply immersed in the receptacle, mouth almost closed. *Stamens* 1—3, inflexed in bud. *Pistillode* 0. *Ovary* included; ovule pendulous; style excentric or lateral, with 2 subulate arms. *Fruit* a minute, crustaceous achene. *Albumen* 0; cotyledons subequal, contorted, embracing the upcurved radicle.

DORSTENIA INDICA, Wight; F. B. I. v. 494; Wt. Ic. t. 1964.

In the hills from the Nilgiris and Shevaroy's southwards; in cool and damp localities, from 1,800—6,000 ft.

A succulent herb 4—18 in. high. Leaves lanceolate, undulate to serrate, variable in size; receptacles peltate, obconic, with 5—12 linear arms.

Morus alba, Linn., the mulberry, is cultivated for its fruit, and with *M. indica*, Linn., for leaves for feeding silk-worms, in several localities. The two species are not easily separated, the chief points of distinction being the obovate ♀ sepals and the styles connate below in *M. indica*.

Family CXXXIX. URTICACEAE.

Herbs, shrubs or small trees, some with stinging hairs. *Leaves* opposite or alternate, 3-ribbed or penninerved, entire or lobed. *Flowers* small, greenish, monoecious or dioecious, in open or capitate cymes or spikes or aggregated on a fleshy receptacle, sometimes involucrate. *Perianth* of 4—5 (rarely 2—3) free or united sepals, usually united in ♀ and sometimes accrescent and fleshy in fruit. *Stamens* as many as the sepals, usually inflexed in bud with reversed anthers, later

elastically reflexed. *Pistillode* usually present, various. *Ovary* superior, 1-celled; style simple or 0; stigma papillose, plumose or penicillate; ovule single, basal, erect. *Fruit* a drupe or an achene, usually enclosed in and often adnate to the perianth. *Seed* with a membranous testa; embryo straight.

Plants with stinging hairs, at least on the inflorescence:—

Flowers clustered on cymes or spikes:—

Slender annual flexuous herbs; stipules small or 0; stinging hairs weak; flower clusters small.....1. *Fleurya*.

Coarse perennial erect herbs or undershrubs; stipules large, foliaceous; stinging hairs stout; flower clusters large.....2. *Girardinia*.

Flowers not clustered.....3. *Laportea*.

Plants without stinging hairs:—

Herbs or undershrubs:—

Flowers, at least ♀, aggregated on a fleshy receptacle:—

Normal leaves opposite; receptacles long-peduncled.....4. *Lecanthus*.

Normal leaves alternate; receptacles sessile or short-peduncled (long-peduncled in two species of *Elatostemma*):—

♂ and ♀ flowers aggregated on a fleshy receptacle.....5. *Elatostemma*.

♂ flowers cymose, ♀ aggregated on a fleshy receptacle.....6. *Procris*.

Flowers not aggregated on a fleshy receptacle:—

Flowers not enclosed in a campanulate involucre:—

Leaves stipulate:—

Flowers cymose; cystoliths of leaves linear:—

Leaves opposite, serrate.....7. *Pilea*.

Leaves alternate, entire.....8. *Pellionia*.

Flowers in sessile clusters; cystoliths of leaves punctiform:—

Leaves serrate; stigma ovate, persistent.....9. *Chamabaina*.

Leaves usually entire; stigma filiform, deciduous.....10. *Pouzolzia*.

Leaves exstipulate.....11. *Parietaria*.

Flowers enclosed in a campanulate involucre.....12. *Droguetia*.

Small trees or large shrubs:—

Inflorescence in clusters on long spikes; fruiting perianth dry.....13. *Boehmeria*.

Inflorescence in clusters on short cymes or on panicles; fruiting perianth more or less fleshy:—

Leaves not white-tomentose below; stigma discoid, ciliate-fimbriate

14. *Villebrunea*.

Leaves white-tomentose below; stigma sessile, penicillate.....15. *Debregeasia*.

1. *Fleurya*, Gaud.

Annual herbs with stinging hairs. *Leaves* alternate, toothed, 3-ribbed, with linear cystoliths; stipules narrow, connate in pairs or 0. *Flowers* monoecious or dioecious, clustered on axillary, unisexual or androgynous, spikes or cymes. *Perianth* of ♂ of 4–5 ovate-lanceolate sepals, of ♀ of 4 sepals free or united into a 4-lobed cup. *Stamens* 4–5, inflexed in bud. *Pistillode* globose or clavate. *Ovary* oblique; style obliquely ovoid or linear, ultimately hooked with sometimes 2 basal arms. *Achene* oblique, compressed, membranous, exserted. *Seed* nearly exalbuminous; cotyledons broad.

FLEURYA INTERRUPTA, Gaud.; F. B. I. v. 548; Wt. Ic. t. 1975. *Urtica interrupta*, Linn.; Wt. Ic. t. 692.

In the hills, mainly south of Mysore, from 500–6,000 ft. Rampa Hills (V. Narayanswami).

A nettle-like herb with ovate, acuminate, coarsely-toothed leaves.

Fruiting spikes sometimes a foot long.

2. *Girardinia*, Gaud.

Strong herbs or undershrubs with long stinging hairs. *Leaves* alternate, 3-ribbed, entire or lobed; stipules connate, foliaceous. *Flowers* monoecious or dioecious, clustered on simple or panicked spikes or heads, armed with numerous stinging hairs. *Perianth* of ♂ of 4—5 free, valvate sepals, of ♀ a 2—3-lobed, ventricose tube eventually split down one side. *Stamens* 4—5, inflexed in bud. *Pistillode* globose or cupular. *Ovary* straight, ovule erect; stigma subulate, papillose. *Achene* broad, compressed. *Seed* nearly exalbuminous; cotyledons broad.

Leaves entire or 3—7-lobed, margins inciso-serrate, acuminate, base narrowed, truncate or cordate, 3-ribbed, appressed hairy and with stout stinging hairs on the ribs and nerves; stipules 1.5—3 in. long, cordate at base; flowers dioecious in long simple or branched spikes, often very long in fruit.....1. *Leschenaultiana*.

Leaves 3—7-lobed, margins inciso-serrate, acuminate, base usually truncate or cordate, 3-ribbed, more or less appressed-hairy, with or without rather slender stinging hairs on the ribs and nerves; stipules 3—6 in. long, cordate or truncate at base; flowers monoecious, usually in simple spikes, ♀ usually aggregated in heads along the rhachis.....2. *zeylanica*.

1. *GIRARDINIA LESCHENAUTIANA*, Dcne.; Wt. Ic. tt. 1976. *Girardinia heterophylla*, Dcne., var. *palmata*, Gaud.; F. B. I. v. 551.

Mountains of the W. Gháts from 4,000—7,000 ft. The Nilgiri Nettle.

A strong stinging-nettle, often growing gregariously near habitations.

2. *GIRARDINIA ZEYLANICA*, Dcne. *Girardinia heterophylla*, Dcne., var. *zeylanica*, Dcne.; F. B. I. v. 551. *Urtica heterophylla*, Wt. Ic. t. 687.

Hills of Southern India and on the West Coast from 1,000—5,000 ft. The Nilgiri Nettle.

A stinging-nettle not easily distinguished from the last species.

3. *Laportea*, Gaud.

Herbs, shrubs or trees with stinging (sometimes minute) hairs. *Leaves* alternate, entire or toothed, 3-ribbed or penninerved; stipules free or connate. *Flowers* monoecious or dioecious, in paniculate, usually unisexual, cymes or racemes. *Perianth* of ♂ of 4—5 subvalvate sepals, of ♀ of 4 subequal segments or one outer smaller or absent. *Stamens* 4—5, inflexed in bud. *Pistillode* clavate or subglobose. *Ovary* eventually oblique; ovule erect; style linear, papillose on one side. *Achene* oblique, compressed, membranous or fleshy, seated on the perianth. *Seed* nearly exalbuminous; cotyledons broad.

Herbs; leaves broadly ovate to elliptic, acuminate; base usually rounded, rarely narrowed, 3-ribbed, 2.5—8 in. long, 1.5—5 in. wide, coarsely toothed, smooth, pubescent or scabrous, variable in the amount of stinging hairs on both surfaces; ♂ cymes slender, mostly axillary, ♀ cymes stout, subterminal, the pedicels broadly winged.....1. *terminalis*.

Soft stemmed shrubs or small trees; leaves narrow-lanceolate to broadly elliptic, shortly acuminate, base narrowed, rarely rounded, penninerved, 5—12 in. long, 2—5.5 in. wide, entire or crenulate in the upper half, glabrous or nearly so, shining above, the petioles sometimes with many stinging hairs; cymes axillary, pedicels of ♀ cylindric.....2. *crenulata*.

1. *LAPORTEA TERMINALIS*, Wt. Ic. t. 1972; F. B. I. v. 549.
W. Gháts in evergreen forests, 5,000—7,000 ft.
A slender nettle. The sting is not very virulent.
2. *LAPORTEA CRENULATA*, Gaud.; F. B. I. v. 550; Bedd. Fl. t. 306.
Urtica crenulata, Roxb.; Wt. Ic. t. 686.
W. Gháts from 1,000—5,000 ft. Rampa Hills, 2,500 ft. (Gamble).
The Elephant Nettle, Fever Nettle, Devil Nettle.
A stout shrub or small tree. Bark white, smooth, very thin; wood pale-brown, very soft, useless; the fibre yields a strong, useful cordage. The sting of the hairs is very painful and lasting, particularly during the flowering season, when it may bring on violent sneezing and fever. Vern. *Tam.* Otta-pilavu; *Mal.* Ana-choriya.

4. *Lecanthus*, Wedd.

Herbs, more or less succulent; stems often decumbent and rooting at the base. *Leaves* in opposite, petioled, unequal pairs, subrotund, ovate or elliptic, acute; base 3-ribbed, narrowed, often oblique, serrate, or sometimes the small ones nearly entire, cystoliths linear; stipules small, scarious. *Flowers* monoecious or dioecious, crowded or solitary, axillary, long-peduncled, bracteate, saucer-shaped, unisexual or androgynous fleshy receptacles, the ♀ often mixed with sterile flowers. *Perianth* of ♂ of 4—5 (usually 4) free, equal, usually narrowly hooded sepals, of ♀ of 3—6 (usually 4) free unequal sepals, one larger than the others and usually more deeply and broadly hooded, of sterile flowers irregular, often with 8 segments in 2 series. *Stamens* 4—5 (usually 4). *Pistillode* 0. *Staminodes* in fertile ♀ 4, minute, quadrate. *Ovary* narrowly ellipsoid, shortly stipitate; stigma sessile, penicillate. *Achene* ellipsoid, muriculate. *Albumen* fleshy; cotyledons elliptic, radicle conical.

LECANTHUS WIGHTII, Wedd.; F. B. I. v. 559. *Elatostemma ovatum*, Wt. Ic. t. 1985.

In moist and shady places in the hills from 4,000—7,000 ft. Mahendragiri (Fischer), Mysore, Nilgiris, Anamalais (Fischer), Pulneys (Bourne).

A variable herb, 2—18 in. high. Leaves and capitula equally variable in size (up to 6 in. long and .5 in. diam. respectively). ♂ flowers with slender pedicels 3 times longer than the calyx, ♀ sessile and pedicelled up to the length of the longest sepal in the same capitulum.

5. *Elatostemma*, Forst.

Herbs or undershrubs. *Leaves* alternate or sometimes with a small or minute leaf subopposite to the normal one, distichous, sessile or shortly petioled, usually inequilateral and more or less oblique, 3-ribbed from the base or a little above it; stipules lateral or intrapetiolar. *Flowers* minute, monoecious or dioecious, crowded on sessile or peduncled, 1-sexual, usually involucrate receptacles, the outer bracts often spurred, their bases free or more or less confluent into a fleshy

circular or lobed disk, the florets often in clusters in the heads and mixed with bracteoles. *Perianth* of ♂ of 4–5 free sepals, 2 or more usually tuberculate or spurred on the back, of ♀ of 3–5 free, persistent sepals, usually minute or shorter than the ovary. *Stamens* 4–5, inflexed in bud. *Pistillode* minute. *Ovary* straight; ovule erect; stigma sessile, penicillate. *Achene* minute, ellipsoid or fusiform, usually ribbed. *Seed* usually exalbuminous; testa membranous; cotyledons ovate or semiterete.

Normal leaves alternate without (very rarely with) subopposite small ones:—

♂ receptacles sessile or very shortly peduncled (unknown in 4. *cuneatum*):—

Large herbs, usually over 1 ft. high; leaves acuminate or caudate:—

Leaves with large conspicuous cystoliths:—

Leaves sessile or shortly petioled, obliquely lanceolate, oblanceolate or oblong, caudate, coarsely sharply serrate from the base or just above; base inequilateral, narrowed or the lower side rounded, 1·3–6 in. long, ·5–2·2 in. wide, glabrous or with scattered hairs above, more or less pilose on the nerves below; lateral ribs rather indistinct, the lower one arched, cystoliths abundant, obscure below; stipules lanceolate, acute, glabrous; receptacles sessile or very shortly peduncled, solitary or 2–3 in an axil.....1. *sessile*.

Leaves subsessile, very variable, linear, linear-lanceolate or obliquely lanceolate, acuminate or caudate; base acute, nearly equilateral, ·8–7 in. long, 1–2 in. wide; margins entire (in the narrow forms) or coarsely, subacutely serrate in the upper half, the inner margin often toothed for a shorter distance than the outer, glabrous above, glabrous or hairy on the nerves below; lateral ribs distinct, the lower nearly straight; cystoliths crowded and conspicuous; stipules lanceolate, usually hairy; receptacles sessile, small, solitary or crowded in the axils.....2. *lineolatum*.

Leaves without cystoliths or cystoliths minute and inconspicuous, subsessile, obliquely oblong or oblong-lanceolate, caudate, coarsely crenate-toothed in the upper two-thirds, usually over a greater distance on the outer side; base acute or subacute, ribs distinct, 1·5–6 in. long, 4–1·5 in. wide, quite glabrous; receptacles sessile, small, solitary.....3. *acuminatum*.

Dwarf herbs, 3–8 in. high, more or less pubescent; leaves sessile or shortly petioled, falcately cuneate or hatchet-shaped; apex rounded or subacute, base inequilateral, subauricled on the lower side, very rarely with a minute opposite leaf, the uppermost 3–5 leaves coarsely crenate above the middle, ·5–1·3 in. long, 4–75 in wide, those below much smaller and often entire; cystoliths numerous on both sides; receptacles solitary; ♀ bracts confluent below into a fleshy disk, the tips produced beyond the florets, acute, ciliate.....4. *cuneatum*.

♂ receptacles long-peduncled; leaves sessile, subfalcately oblong-lanceolate, subcaudately acuminate, coarsely subserrately toothed from above the lower one-third, usually for a shorter distance on the upper margin; base inequilateral, subacute, sometimes subauricled, 2–7 in. long, 6–1 in. wide, the lowest much reduced; ribs distinct, rather broad; cystoliths numerous; stipules short, broad; receptacles solitary or twin; sometimes the 2 sexes from the same axil, ♂ with a long, succulent peduncle, 1–1·8 in. long, glabrous, up to 4 in. in diam. with rounded membranous bracts; ♀ sessile, much smaller, silvery.....5. *Wightii*.

Normal leaves subtended by small filiform, linear, lanceolate or oblong, subopposite, usually deflexed, very small ones, very variable, sessile or shortly petioled, subfalcately lanceolate or ovate, acuminate or the lower rounded; base inequilateral, acute or subauricled on the lower side, 4–3·5 in. long, 2–1·3 in. wide, crenate-serrate in the upper half or sometimes with only 2 teeth on either side of the apical one; glabrous, ribs distinct, rather broad; cystoliths numerous above, obscure below; ♂ receptacles very long- or short-peduncled, the outer bracts usually horned; ♀ smaller, sessile.....6. *surculosum*.

1. *ELATOSTEMMA* SESSILE, Forst.; F. B. I. v. 563.

W. Ghâts in evergreen woods, 5,000–7,000 ft.

A herb 1–2 ft. high, usually prostrate and rooting below.

Var. *cuspidata*, Wedd.; F. B. I. v. 564. *E. cuspidata*, Wight Ic. t. 1983 (not 2091, fig. 1). Leaves glabrous or setose above, pubescent on the nerves beneath.

Var. *pubescens*, Hook. f.; F. B. I. v. 564. Stem and leaves more or less substrigosely tomentose.

2. *ELATOSTEMMA LINEOLATUM*, Wt. Ic. t. 1984 and 2091, fig. 1; F. B. I. v. 565.

W. Gháts in evergreen forests from 1,800—7,500 ft. Vizagapatam Hills at 4,000 ft. (A. W. Lushington).

A herb or undershrub, very variable in foliage and habit.

Var. *falcigera*, Thw. Branchlets more or less fuscous or tawny-tomentose; leaves falcately linear-lanceolate, entire or with one or two teeth.

Var. *linearis*, Thw. Leaves linear, entire or with 1—2 large teeth, ribs and nerves obscure.

3. *ELATOSTEMMA ACUMINATUM*, Brongh.; F. B. I. v. 566.

Nilgiri and Anamalai (Beddome, Fischer) Hills at about 4,000 ft. Rare.

A much branched undershrub, woody below.

4. *ELATOSTEMMA CUNEATUM*, Wt. Ic. t. 2091, fig. 3; F. B. I. v. 568.

Rampa District at 2,000 ft. on Peddakonda near Maradumalli (V. Narayanswami). The only record for the area.

A small, slender herb.

5. *ELATOSTEMMA WIGHTII*, Hook. f.; F. B. I. v. 570.

At Avalanche in the Nilgiri Hills (Wight), Anamalai Hills (Beddome).

A succulent herb.

6. *ELATOSTEMMA SURCULOSUM*, Wt. Ic. t. 2091, fig. 4; F. B. I. v. 572.

W. Gháts in evergreen forests, 5,000—7,000 ft.

A small rather succulent herb, often growing on rocks and tree-trunks in cool, shady places.

6. *Procris*, Juss.

Succulent herbs or shrubs. *Leaves* alternate or, as in *Elatostemma*, with a very small leaf opposite or subopposite to the normal one; base unequal, cystoliths linear. *Flowers* monoecious, axillary, mostly in the axils of fallen leaves, ♂ in small cymes or clusters, ♀ aggregated on a fleshy, peduncled receptacle. *Perianth* of ♂ 5-partite, lobes ovate, fleshy, of ♀ of 3—5 obovate, cucullate, fleshy sepals. *Stamens* 5. *Staminodes* 0. *Pistillode* rudimentary, globose or obovate. *Ovary* ovate; stigma sessile. *Achene* ovate or ellipsoid, subacute, striolate. *Embryo* turbinate; albumen 0 or scanty; cotyledons broadly elliptic; radicle long, conical.

PROCRIS WIGHTIANA, Wall. ex Wedd. *P. laevigata*, Bl. in part; F. B. I. v. 575.

W. Gháts and hills of the Carnatic in evergreen forest and in cool moist places from 4,000—6,500 ft.

A succulent, branched herb. Normal leaves shortly petioled, lanceolate or oblanceolate, acuminate or caudate; base tapering,

2·5–7 in. long, 1·6–1·5 in. wide, crenate-serrate from a little above the base or higher, rarely nearly entire, quite glabrous, primary nerves 5–7 pairs, distinct. ♀ receptacles small, usually several in each axil.

7. *Pilea*, Lindl.

Herbs. *Leaves* in opposite equal or unequal pairs, 3-ribbed, serrate, usually with numerous, minute linear (in our species) cystoliths which look like appressed hairs when the leaf is dry; stipules connate, intrapetiolar. *Flowers* minute, monoecious or dioecious, in axillary, peduncled, dichotomous cymes; bracts small or 0. *Perianth* of ♂ of 2–4 free or connate sepals, often gibbous or spurred, of ♀ of 3 (rarely 4) unequal sepals, the dorsal longest, sometimes gibbous or spurred. *Stamens* 2–4. *Pistillode* minute, conic or oblong. *Staminodes* minute or 0. *Ovary* straight; ovule erect; stigma sessile, penicillate. *Achene* ovoid, oblong or suborbicular, compressed, smooth or granulate. *Seed* erect; albumen scanty; cotyledons broad.

Stipules caducous, small, ovate, acute; lateral ribs of nerves curved and more or less converging towards the apex:—

Lateral ribs of leaves evanescent before reaching the apex, primary nerves not numerous, nor regular and parallel; petioles glabrous; achenes smooth or very slightly granular:—

Leaves ovate or rotund-ovate, usually about 1 in. long (up to 2 in. long, 1·25 in. wide), acuminate; base subcordate, sharply, narrowly serrate to just below the apex; lateral ribs evanescent a short distance below the apex, quite glabrous, usually punctate below; petioles 3–1·25 in. long; cymes peduncled, open; sepals spurred; achenes ovoid, apex narrowed, smooth.....1. *Wightii*. Leaves ovate-lanceolate to subrotund, 1–6 in. long, terminating in a narrow, entire cusp; base never emarginate; lateral ribs evanescent about $\frac{2}{3}$ of the way up; marginal teeth broad, blunt or subacute; upper surface with scattered hairs, not punctate below; petioles 4–3·2 in. long; cymes peduncled, open, sepals rounded, not spurred; achenes suborbicular, apex rounded, smooth or slightly granular.....2. *Kingii*.

Leaves narrowly lanceolate to broadly ovate, sometimes falcate, acuminate or finely caudate, 2·25–10 in. long, 1·75–4·25 in. wide, sharply serrate; lateral ribs prolonged right into the apex; primary nerves numerous, regular, nearly straight, parallel between the ribs; petioles 1·3–5 in. long, often hairy at least just below the blade; cymes peduncled, open; achenes granular.....3. *trinervia*.

Stipules subpersistent, large, linear-oblong to oblong, 1 in. long or more; apex rounded; leaves elliptic, acuminate, 3–5 in. long, 1·5–2·5 in. wide; lateral ribs nearly straight, not converging towards the apex, crenate-serrate; petioles 1·3–1·75 in. long; peduncles short, cymes shorter than the petioles, aggregated; achenes smooth.....4. *stipulosa*.

1. *PILEA WIGHTII*, Wedd.; F. B. I. v. 554. *P. radicans*, Wt. Ic. t. 1974.

Evergreen forests of the W. Gháts, 4,000–7,500 ft.

A flaccid herb.

2. *PILEA KINGII*; C. Fischer in Kew Bull. 1927, 76. *P. Wightii*; Wedd var. *macrophylla*, Hook. f.; F. B. I. v. 555.

Evergreen forests of the W. Gháts, 5,000–7,000 ft.

A glabrous herb similar to the last species but more robust.

3. *PILEA TRINERVIA*, Wt. Ic. t. 1973; F. B. I. v. 557.

Evergreen forests of the W. Gháts, 2,000–8,000 ft. Kollimalais of Trichinopoly District (Barber).

A robust succulent herb up to 7 ft. high with swollen internodes.

4. *PILEA STIPULOSA*, Miq.; F. B. I. v. 555.

Pulney Hills; Gundattu Shola (Bourne).

A stout herb at once recognized by the large stipules which, like the leaves, bear innumerable linear cystoliths, these, however, here are black (at least when dry).

Pilea microphylla, Liebm. *P. muscosa*, Lindl.; F. B. I. v. 551, the Gunpowder or Artillery Plant, is a small prostrate species with very small rotund or spatulate, entire leaves which is grown in borders in gardens and has run wild in many places. The ripe pollen is ejected in clouds when the plant is jolted.

8. *Pellionia*, Gaud.

Herbs. *Leaves* distichous, alternate or subopposite, but appearing alternate by the suppression or excessive reduction of one of each successive pair, inequilateral, entire or serrate, 3-ribbed or penninerved, with numerous linear cystoliths; stipules usually large. *Flowers* monoecious or dioecious, in open or contracted, sometimes capituliform, bracteate, peduncled, axillary cymes (not seated on a receptacle). *Perianth* of ♂ 5-partite, segments acute, with a membranous margin, mucronate on the back, of ♀ deeply 5-partite; segments equal or unequal, mucronate below the apex. *Stamens* 5. *Pistillode* conical. *Staminodes* 5, scale-like. *Ovary* elliptic. *Achene* broadly ovate, more or less compressed. *Seed* subexalbuminous; radicle conical.

PELLIONIA HEYNEANA, Wedd.; F. B. I. v. 561.

In evergreen woods in the W. Ghâts, 1,500—6,000 ft.

A herb; stem woody and creeping below; the tips hairy. *Leaves* alternate or subopposite, with one of the pair very small, falcate, linear-lanceolate to broadly lanceolate, acuminate or caudate, base 3-ribbed, narrowed and unequally cordate, 2—9 in. long, .75—3.5 in. wide, quite glabrous or the ribs beneath pilose, quite entire; petiole short; stipules narrow-ensiform, aristate, up to .5 in. long. Peduncles short or long, glabrous or hairy.

9. *Chamabaina*, Wight.

Diffuse herbs. *Leaves* opposite, equal or nearly so, 3-ribbed, serrate; cystoliths punctiform; stipules paired, free, conspicuous, persistent, enclosing the young flower-clusters. *Flowers* monoecious (or dioecious?), in axillary, bracteolate clusters; ♂ shortly pedicelled in the upper axils, ♀ clusters dense. *Perianth* of ♂ valvately 4-lobed, lobes mucronate, hairy, of ♀ tubular, compressed, minutely 4-toothed, hirsute. *Stamens* 4. *Pistillode* rudimentary, clavate. *Ovary* included; ovule erect; stigma ovate, fimbriate, spreading. *Achene* compressed, ovate, acute, enclosed in the persistent perianth; pericarp crustaceous. *Seed* albuminous; cotyledons ovate.

CHAMABAINA CUSPIDATA, Wt, Ic. t. 1981; F. B. I. v. 580.

Nilgiri Hills at about 6,000 ft., in moist woods and on wet ground near streams; not common.

A small diffuse, pubescent herb. Leaves ovate to subrotund, acute, base rounded or acute, 3—1.25 in. long, .2—7 in. wide, bluntly or acutely serrate; stipules scarious, 4 to each node.

10. *Pouzolzia*, Gaud.

Herbs or undershrubs. Leaves alternate, opposite or ternate, 3-ribbed, usually entire, often reduced in size upwards and passing into bracts; cystoliths punctiform; stipules free, often persistent. Flowers minute, usually monoecious, in 1-sexual or androgynous, usually sessile clusters in the axils of the leaves or the bracts, never spicate, but sometimes appearing so by the reduction of the upper leaves; bracteoles small; florets pedicelled. Perianth of ♂ 4—5 (rarely 3-) partite or -lobed, the lobes either concave or transversely plicate and abruptly inflexed making the bud truncate, of ♀ tubular, mouth contracted, 2—4-toothed. Stamens 4—5 (rarely 3). Pistillode clavate or oblong. Ovary included; ovule erect; stigma filiform, jointed to the top of the ovary, deciduous. Achene enclosed in, but usually free from, the winged or wingless, persistent perianth. Seed with a membranous testa; albumen very scanty or 0; cotyledons ovate.

The species are, for the most part, very variable in habit, foliage, flowers and indumentum, so that their classification into species and varieties is a matter of considerable difficulty.

♂ perianth lobes convex or gibbous, buds rounded or acute:—

Leaves opposite or alternate, linear, lanceolate, elliptic, ovate-lanceolate or broadly ovate, apex blunt or acute, base narrowed or rounded and then abruptly, shortly acute, hoary-pubescent, hirsute or glabrate, 4—3.5 in. long, .2—1.5 in. wide, primary nerves 1 pair, lateral ribs not forked; flowers usually strigose, ♂ 4 (rarely 5-) merous; fruit 2—4-winged or not.....1. *indica*.
Lateral ribs of leaves forked, ♂ flowers 5-merous:—

Leaves alternate, ovate-lanceolate to rotund-ovate, acute or acuminate, base narrowed or rounded, .6—5.5 in. long, .2—2.3 in. wide, glabrous or pubescent above, and if the latter also on the sub-prominent ribs and nerves, pubescent or villous below; petioles .1—3 in. long; flowers in sessile clusters in the axils, strigose or hirsute usually with whitish hairs; fruit strigose, winged or not

2. *auriculata*.

Leaves opposite, lanceolate to rotund-ovate, acute or acuminate; base rounded, truncate or subcordate, .8—3 in. long, .4—1.8 in. wide, more or less pubescent above except on the impressed ribs and nerves, pubescent below, at least on the ribs and nerves; petioles up to .5 in. long; flowers axillary, cymose, hirsute; fruit smooth or strongly ribbed, not winged.....3. *cymosa*.

♂ perianth lobes plicate and abruptly inflexed at about the middle; buds truncate:—

Stems running out into terminal or axillary spikes:—

Spikes all axillary; leaves ternate, sessile, lanceolate, acuminate, base rounded or cordate, 2—7 in. long, .4—1.2 in. wide, glabrous; flowers in sessile clusters on solitary or binate, flexuous, bracteolate, scabrid-puberulous spikes up to 9 in. long; ♂ 4-merous, nearly glabrous; fruit winged or not.....4. *Meeboldii*.

Spikes terminal, sometimes also a few from the upper axils:—

Leaves ternate, opposite or alternate, linear to narrowly lanceolate, acute or acuminate; base rounded or narrowed, shortly petioled or sessile, up to 6 in. long, 1 in. wide, reduced upwards and merging into the floral bracts, glabrous or somewhat pubescent and usually hispidulous on the ribs below; flowers in the axils of leaves or bracts in sessile clusters; ♂ 5-merous, ciliate at the flexure, ♀ hirsute, fruit winged.....5. *pentandra*.

Leaves ternate, opposite or alternate, very variable in shape, size and indumentum, up to 6 or 7 in. long, reduced upwards and merging into the floral

bracts; flowers in sessile clusters in the axils of leaves or bracts; ♂ 3—4 (rarely 5-) merous; fruit winged or not.....6. *Wightii*.
 Stem not running out into a bracteate spike, upper leaves not reduced to bracts or markedly smaller; leaves very variable, from ovate to narrow-lanceolate, usually acuminate, base acute, rounded or subcordate, 3—5-ribbed, up to 7 in. long and 2.5 in. wide; flowers in sessile, axillary clusters; ♂ 5- (rarely 4-) merous; fruit winged or not.....7. *Bennettiana*.

1. *POUZOLZIA INDICA*, Gaud. ; F. B. I. v. 581; Wt. Ic. tt. 1980, fig. 1, 2100, fig. 40. *P. procumbens*, Wt. Ic. t. 2099, fig. 35. *P. diffusa*, Wt. Ic. t. 2099, fig. 36. *P. tetraptera*, Wt. Ic. t. 2100, fig. 42, excl. ♂ bud. *P. minor*, Wt. Ic. t. 2100, fig. 43. *P. pilosa*, Wt. Ic. t. 2101, fig. 46. *P. Johnsoniana*, Wt. Ic. t. 2101, fig. 47. *P. pyramidata*, Wt. Ic. t. 2101, fig. 48. *Urtica alienata*, Linn.; Wt. Ic. t. 693. *U. tuberosa*, Roxb.; Wt. Ic. t. 697.

In all districts, sea-level to 6,000 ft.

A very variable, slender, erect or procumbent, hirsute or pubescent herb.

2. *POUZOLZIA AURICULATA*, Wt. Ic. tt. 1980, fig. 2, 2099, fig. 37; F. B. I. v. 582. *P. rostrata*, Wt. Ic. tt. 1980, fig. 3, 2099, fig. 34. *P. rotundifolia*, Wt. Ic. t. 2098, fig. 31, excl. ♂ bud. *P. elliptica*, Wt. Ic. t. 2098, fig. 32. *P. bicuspidata*, Wt. Ic. t. 2098, fig. 33, excl. ♂ bud. *P. Rheedii*, Wt. Ic. t. 2099, fig. 38. *P. scabrida*, Wt. Ic. t. 2100, fig. 41. *Urtica vesicaria*, Roxb.; Wt. Ic. t. 695.

In all districts, near sea-level to 6,500 ft.

A flaccid or stout, usually tall herb.

3. *POUZOLZIA CYMOSA*, Wt. Ic. t. 1979, fig. 2. *P. auriculata*, Wight, var. *cymosa*, Hook. f.; F. B. I. v. 582.

In the Nilgiri, N. Coimbatore, Shevaroy and Kollimalai Hills, 4,000—6,000 ft.

A herb.

4. *POUZOLZIA MEEBOLDII*; W. W. Smith et Ramas.

At Kavalay in Cochin (Meebold), Anamalais (Wight?), Peermade in Travancore (Venkoba Rao).

An erect undershrub.

5. *POUZOLZIA PENTANDRA*, Benn.; F. B. I. v. 583; Wt. Ic. t. 2096, fig. 20. *Urtica pentandra*, Roxb.; Wt. Ic. t. 696.

W. Gháts in Mysore (Meebold), S. Kanara, Nilgiri District, Palghat and N. Coimbatore (Fischer).

An erect, rigid herb, 2—3 ft. high. Apparently not common.

6. *POUZOLZIA WIGHTII*, Benn.; F. B. I. v. 584; Wt. Ic. t. 2093, fig. 8. *P. ternata*, Wt. Ic. t. 2093, fig. 7. *P. concinna*, Wt. Ic. t. 2093, fig. 9. *P. ambigua*, Wt. Ic. t. 2095, fig. 19. *P. trialata*, Wt. Ic. t. 2096, fig. 22. *P. longifolia*, Wt. Ic. t. 2093, fig. 6.

All districts, about 1,000—7,000 ft.

A very variable, usually tall and robust herb, with many varieties, of which only the following seem to be really distinguishable from the type.

Var. *nilghirensis*, Hook. f.; F. B. I. v. 584. *P. neilgherrensis*, Wt. Ic. t. 2097, fig. 26. *P. ovata*, Wt. Ic. t. 2096, fig. 24. *P. oblongifolia*, Wt. Ic. t. 2096, fig. 25.

Stem harshly tomentose or scabrid; leaves coriaceous broadly ovate, elliptic or oblong-lanceolate, up to 6 in. long, 3 in. wide, scabrid above, tomentose below; ♂ sepals hirsute above the flexure. Range of the type.

Var. *Wallichiana*, Hook. f.; F. B. I. v. 584. *P. Wallichiana*, Wt. Ic. t. 2096, fig. 23.

Very like the last, but leaves usually narrower; floral leaves closer and longer; ♂ sepals glabrous. A very doubtfully valid variety. I have seen only two specimens collected by Wight in the Iyamalai Hills near Coimbatore.

Var. *Lawsoniana*, Fischer.

Stem terete and glabrous, rhachis of spike more or less quadrangular and hirsute; cauline leaves subrotund to elliptic, mucronate or acuminate, 1–6 in. long, .75–2.25 in. wide, glabrous; petioles .1–.5 in. long; floral leaves sessile, ovate-lanceolate to broadly cordate, glabrous; ♂ sepals glabrous.

Naduvattam in the Nilgiri Hills (Lawson, ex Herb. Gamble, No. 12933), Shevaroy (Bourne), Anamalais (Beddome), Pulneys (Saulière, Bourne, Barber), Travancore (Barber).

Var. *scabra* Fischer. *P. scabra*, Wt. Ic. t. 2097, fig. 29; F. B. I. v. 584. *P. aspera*, Wt. Ic. t. 2095, fig. 18.

Everywhere scabrid; spikes sometimes axillary as well as terminal and sometimes paniced. W. Ghâts, 1,000–7,000 ft. Horsleykonda in the Chittoor District.

Var. *caudata* Fischer. *P. caudata*, Benn.; F. B. I. v. 585; Wt. Ic. t. 2097, fig. 27. *P. courtallensis*, Wt. Ic. t. 2093, fig. 10.

Stem slender, glabrous; cauline leaves lanceolate to ovate-lanceolate, acuminate, up to 6 in. long and 1.5 in. wide, sessile or nearly so, glabrous; spikes (sometimes paniced) slender, pubescent; bracts becoming very small, cordate, glabrous. ♂ sepals glabrous. W. Ghâts.

7. *POUZOLZIA BENNETTIANA*, Wt. Ic. t. 1978; F. B. I. v. 585. *P. heterocarpa*, Wt. Ic. t. 2094, fig. 14.

W. Ghâts.

An erect, variable herb with several fairly well-defined varieties.

Var. *macrophylla*, Hook. f.; F. B. I. v. 586.

Stems stout and, like the leaves below, tomentose or villous; leaves up to 8 in. long and 2.5 in. wide, scaberulous above; ♂ sepals villous above the flexure.

Var. *tomentosa*, Hook. f.; F. B. I. v. 586. *P. tomentosa*, Wt. Ic. t. 2094, fig. 11.

Everywhere villously tomentose; leaves up to 2.5 in. long and .8 in. wide.

Nilgiri and Pulney Hills above 6,000 ft.

Var. *Gardneri*, Hook. f.; F. B. I. v. 586. *P. Gardneri*, Wt. Ic. t. 2092, fig. 5.

Shrubby, prostrate or decumbent, sparsely hairy; branches, leaves above and ribs below dark brown when dry; leaves ternate or opposite; ♂ sepals more or less hispid above the flexure.

Nilgiri and Pulney (Fischer) Hills at high elevations; Mahendragiri in Ganjam (Fischer) at 4,500 ft.

Var. *ovalifolia*, Hook. f.; F. B. I. v. 586. *P. ovalifolia*, Wt. Ic. t. 2092, fig. 3.

Stem prostrate, slender, glabrous; leaves elliptic-ovate, up to 3 in. long, petioled, scaberulous above, smooth below; ♂ sepals glabrous.

Nilgiri, Pulney (Bourne) and Sirumalai (Bourne) Hills.

Var. *quadrialata*, Hook. f.; F. B. I. v. 586. *P. quadrialata*, Wt. Ic. t. 2094, fig. 12.

Stem prostrate or decumbent, woody below, tomentose above; leaves softly pubescent above, tomentose below, up to 3 in. long; ♂ sepals tomentose or villous above the flexure.

Var. *mysorensis*, Hook. f.; F. B. I. v. 586. *P. mysorensis*, Wt. Ic. t. 2092, fig. 4, excluding the magnified leaves.

Stem slender, 4-angled; leaves flaccid, long-petioled; ribs prominent; ♂ sepals quite glabrous.

Var. *acuta* Fischer. *P. acuta*, Wt. Ic. t. 2092, fig. 2. *P. heterocarpa*, Wt. var. Ic. t. 2094, fig. 13.

Erect; stems sparsely pubescent upwards; leaves ternate or opposite, elliptic, long-acuminate, up to 4 in. long and 1.5 in. wide, sparsely pubescent; ♂ sepals ciliate on the flexures.

11. *Parietaria*, Tourn.

Herbs, rarely undershrubs. *Leaves* alternate, 3-ribbed, entire, exstipulate, cystoliths globose. *Flowers* polygamous in bracteate, cymose clusters. *Perianth* of ♂ (appearing ♂ through the early fall of the stigma) of 3—4 valvate sepals, of ♀ tubular, 4-fid. *Stamens* 3—4, inflexed in bud. *Ovary* straight; ovule erect; stigma recurved, penicillate. *Achene* enclosed in the persistent perianth. *Seed* with copious albumen; cotyledons oblong.

PARIETARIA DEBILIS, Forst.; F. B. I. v. 593.

Nilgiri Hills in the sholas at high elevations.

A small, diffuse, flaccid, pubescent herb. *Leaves* broadly ovate or suborbicular, narrowed to a blunt apex, base rounded, .25—1 in. long; petioles .1—5 in. long. *Flowers* minute, in 3—7-flowered, axillary cymes.

12. *Droguetia*, Gaud.

Slender herbs. *Leaves* alternate or opposite, serrate, cystoliths punctiform; stipules lateral, free. *Flowers* in small, androgynous or 1-sexual, axillary, campanulate, scabrid involucres. *Perianth* of ♂ tubular-clavate, 3—5-fid, of ♀ 0. *Stamen* 1. *Pistillode* 0. *Ovary* straight, woolly; ovule erect; stigma filiform, hispid, persistent. *Achene* ovoid, compressed, woolly. *Seed* with scanty or no albumen; cotyledons broad.

DROGUETIA DIFFUSA, Wedd.; F. B. I. v. 593. *Forskohlia urticoides*, Wt. Ic. t. 1982.

Nilgiri, Pulney and Travancore (Meebold) Hills in shady places, 6,000—7,000 ft.

A small, diffuse herb. Leaves opposite, ovate, acuminate, coarsely serrate, .5—2.3 in. long, .3—1.3 in. wide, hispidly hairy above and on the ribs and nerves below; petioles .2—1 in. long. Flowers minute, in 1- or more-flowered axillary involucre.

13. *Boehmeria*, Jacq.

Shrubs or small trees. Leaves opposite or alternate, toothed, 3-ribbed, cystoliths punctiform; stipules usually free. Flowers monocious or dioecious, in 1-sexual (rarely androgynous) clusters sessile in the axils or in axillary spikes, racemes or panicles. Perianth of ♂ valvately 3—5-lobed or -partite, of ♀ tubular, 2—4-toothed, sometimes angled, winged or swollen. Stamens 3—5, inflexed in bud. Pistillode clavate or globose. Ovary included; ovule erect; stigma filiform, persistent. Achene at first closely invested by the perianth, later free. Seed albuminous; cotyledons ovate.

Leaves alternate, equal or alternately large and small, narrowly or broadly ovate, acuminate or finely caudate, base rounded or subacute, rarely subcordate, crenulate or serrulate, with small, bluntish teeth, sometimes nearly entire, 2—8 in. long, 1—4 in. wide, glabrous or rarely with a few hairs above, pubescent below; petioles .5—4 in. long; flowers in small axillary clusters.....1. *malabarica*. Leaves opposite, rarely alternate, subequal, very variable, suborbicular to ovate, acuminate or finely caudate, base rounded or cordate, coarsely, triangularly, acutely serrate with large teeth, 3—10 in. long, 1.5—8 in. wide, more or less hairy above, with hairs often with bulbous bases, pubescent below (tomentose in one variety); petioles up to 7 in. long; flowers in clusters on long axillary spikes

2. *platyphylla*.

1. *BOEHMERIA MALABARICA*, Wedd.; F. B. I. v. 575.

Evergreen forests of the W. Gháts, 1,000—4,000 ft.

A large shrub or small tree. Bark thin, greyish-brown.

2. *BOEHMERIA PLATYPHYLLA*, Don.; F. B. I. v. 578.

Hills of the Northern Circars, 2,000—4,000 ft. Darangabadi in Ganjam (Barber), Mahendragiri (Fischer), Rampa (Gamble, Narayanswami).

A spreading shrub.

Var. *tomentosa*, Wedd.; F. B. I. v. 578. Leaves softly tomentose or villous on both sides, the young shoots shaggy; spikes stout.

Endrika in the Vizagapatam Hills at 5,000 ft. (A. W. Lushington).

Var. *longissima*, Hook. f.; F. B. I. v. 579. *Splitgerbera macrostachya*, Wt. Ic. t. 1977.

Leaves ovate; spikes very long and fine, usually much longer than the leaves, up to 20 in. long, drooping. Clusters and spikes rarely androgynous.

B. nivea, Hook. & Arn.; F. B. I. v. 576. *Urtica tenacissima* Roxb.; Wt. Ic. t. 688.

A shrub cultivated ornamentally or for its fibre. The Rhea Plant.

Leaves orbicular or broadly ovate, acuminate, scabrid above, white with cobwebby pubescence below; flowers in clusters in axillary panicles.

14. *Villebrunea*, Gaud.

Trees or large shrubs. *Leaves* alternate, penninerved or 3—5-ribbed, entire or crenulate; cystoliths punctiform; stipules bifid. *Flowers* monoecious or dioecious, clustered, clusters axillary, sometimes in short cymes or panicles, bracts minute. *Perianth* of ♂ 3—5 (usually 4) fid, of ♀ tubular, ovoid, narrowed to a minute, toothed mouth. *Stamens* 3—5, usually 4. *Pistillode* obovate-clavate, pilose below. *Ovary* adnate to the perianth; ovule erect; stigma discoid, ciliate-fimbriate. *Achene* free or adnate to the perianth, embraced below by the marcescent, fleshy bracteoles. *Seed* amply albuminous; cotyledons broad.

VILLEBRUNEA INTEGRIFOLIA, Gaud.; F. B. I. v. 589.

W. Gháts, 900—4,500 ft.

A small, evergreen tree. *Leaves* lanceolate or oblanceolate, acuminate or subcaudate, base narrowed, 2·5—10 in. long, ·9—2·5 in. wide, penninerved, primary nerves 8—9 pairs, entire or somewhat crenulate, glabrous above, pubescent on the nerves below; petioles ·25—1·25 in. long, usually pubescent. *Flowers* in globose clusters in shortly peduncled, dichotomous, hispid cymes, usually from the axils of fallen leaves.

15. *Debregeasia*, Gaud.

Trees or shrubs. *Leaves* alternate, 3-ribbed, serrate or entire, petioled, cystoliths punctiform; stipules connate, intrapetiolar, 2-fid. *Flowers* monoecious or dioecious, in dense, globose, paniced or spicate sessile clusters. *Perianth* of ♂ of 3—5, usually 4, valvate sepals, of ♀ tubular, ovoid or obovoid, mouth contracted and minutely toothed. *Stamens* 3—5, usually 4. *Pistillode* ellipsoid, glabrous or woolly at the base. *Ovary* straight, included; ovule erect; stigma sessile, penicillate. *Achene* at first adnate to the persistent, fleshy perianth. *Seed* with copious or scanty albumen; cotyledons short, broad.

Branchlets slender, pilose; leaves linear- to oblong-lanceolate, acute or acuminate, base rounded, 2—9 in. long, ·4—2·5 in. wide, closely serrulate, rugose, pubescent or scabrid above, below white- or ashy-tomentose and lacunose and pilose on the ribs and nerves; petioles ·3—1·2 in. long, pilose; flowers in small heads in short, dichotomous cymes from the axils along the branchlets.....1. *velutina*.

Branchlets thick, nearly glabrous; leaves rotund or sometimes rotund-ovate, apex suddenly and finely cuspidate, base rounded or subcordate, 4—9 in. in diam., quite entire, glabrescent and dark above, white or ashy tomentose below, primary nerves 3—4 pairs above the lateral ribs; petioles 1·7—9 in. long, thinly woolly or glabrous; flowers in larger heads in long-peduncled, paniced cymes from the axils of the terminal leaves; peduncles 2—4 in. long.....2. *ceylanica*.

1. DEBREGEASIA VELUTINA, Gaud.; F. B. I. v. 590. *Conocephalus niveus*, Wt. Ic. t. 1959.

W. Gháts, 1,000—6,000 ft.; fairly common.

A small tree, the branches rough with warty excrescences and the scars of fallen leaves. Bark greyish-brown; wood reddish-brown, used only for charcoal; the fibre useful for fishing-lines. Fruit yellow when ripe. Vern. *Tam. Katunochchi*.

2. DEBREGEASIA CEYLANICA, Hook. f.; F. B. I. v. 592.

Anamalai Hills of Coimbatore (Fischer) and hills of Travancore (Rama Rao, Venkoba Rao), 2,000—3,500 ft.

A small tree, very little known in South India.

Family CXL. CASUARINACEAE.

Trees or shrubs with cylindric, jointed branchlets. *Leaves* reduced to subulate scales, connate at the base to form short sheaths at the nodes. *Flowers* minute, monoecious or dioecious, ♂ in slender terminal spikes, ♀ in ovoid or globose bracteate and 2-bracteolate heads. *Perianth* of ♂ of 1—2 scarious sepals, of ♀ 0. *Stamen* 1, inflexed in bud; anther large. *Ovary* minute, 1-celled (or 2-celled with one suppressed); ovules 2, collateral; stigmas 2, long, filiform. *Carpophore* forming a cone with the achenes enclosed in the enlarged, coriaceous or woody bracteoles. *Seed* with a terminal wing, tipped by the style; albumen 0; embryo straight; cotyledons flat, equal; radicle very short, superior.

Casuarina, Forst.

The only genus with the characters of the family.

CASUARINA EQUISETIFOLIA, Forst.; F. B. I. v. 598.

Extensively planted on the sea-shore sands along both coasts and to a certain extent inland and up to about 4,000 ft. The Casuarina or Beefwood Tree.

A fast-growing, erect, tall tree. Bark brown, rough, fibrous, peeling in vertical stripes; wood yellowish-pink to reddish-brown, very hard; useful for scaffolding poles and an excellent fuel. Scales in whorls of 6—8, usually 7; teeth acute or setaceous; internodes rarely exceeding .25 in long, rather prominently ribbed. Valves of the cone pubescent outside. Vern. *Ur. Jhabuko*; *Tel. Savuku*, Chavukku; *Tam. Chauku*, Chavukku; *Mal. Sampirani*; *Kan. Kasrike*.

Other species, e.g. *C. quadrivalvis*, Labill., *C. suberosa*, Ott. & Diet., *C. glauca*, Sieb., have been planted in the Nilgiri Hills.

Family CXLI. SALICACEAE.

Trees or shrubs. *Leaves* alternate, simple, stipulate. *Flowers* dioecious (rarely monoecious), in close bracteate spikes (catkins), one flower to each bract, ebracteolate. *Perianth* 0. *Disk* cupular or of 1 or more scales or glands. *Stamens* 2 or more; filaments free or connate. *Ovary* sessile or stalked, 1-celled; ovules few-many, erect; style short or 0; stigmas short, notched or lobed. *Capsule* ovoid or lanceolate, 2—4-valved. *Seed* with a pencil of long, silky, deciduous hairs; albumen 0; cotyledons plano-convex; radicle short, inferior.

Salix, Linn.

Characters of the family. *Stamens* 2—12 (usually 2). *Disk* of 2 fleshy or glandular scales. *Ovules* 4—8.

SALIX TETRASPERMA, Roxb. Cor. Pl. t. 97; F. B. I. v. 626; Wt. Ic. t. 1954; Bedd. Fl. Syl. t. 302; Brand. For. Fl. t. 58. *S. ichnostachya*, Lindl.; F. B. I. v. 628; Wt. Ic. t. 1953.

In all Districts up to 8,000 ft.; usually near streams. The Indian Willow.

A small or fairly large tree. Bark rough with deep, vertical fissures, greyish-brown; wood red, soft, porous, not much used, makes good gunpowder-charcoal; the twigs are woven into baskets. Leaves linear- to ovate-lanceolate, acuminate, base narrowed or rounded, 2—6 in. long, 4—2.25 in. wide, entire or serrate; petioles up to 1 in. long. Flowers in lax or dense-flowered catkins, which are nearly glabrous, pubescent, villous or densely tomentose. Vern. *Hind.* Bains; *Ur.* Baisi; *Tam.* Vanji, Nirvanji; *Mal.* Vanji; *Kan.* Baiché.

Family CXLII. CERATOPHYLLACEAE.

Slender, submerged water-herbs. *Leaves* whorled, dichotomously cleft into filiform minutely-toothed lobes; stipules 0. *Flowers* minute, monoecious, solitary, axillary, sessile. *Perianth* (or involucre) of both sexes of 6—12 narrow subvalvate, 2-fid segments. *Stamens* 12—30; filaments very short; anthers erect, extrorse, connective truncate or 2—3-toothed at the apex. *Ovary* sessile, ovoid, 1-celled; ovule 1, pendulous, straight; style subulate, stigmatic on one side. *Fruit* a small coriaceous, ovoid or ellipsoid, somewhat compressed nutlet terminating in the persistent long style and furnished on either side with a long subulate spur projecting from a little above the base, sometimes narrowly winged. *Seed* exalbuminous; embryo straight; cotyledons thick; radicle short, inferior.

Ceratophyllum, Linn.

The only genus, with the characters of the family.

CERATOPHYLLUM DEMERSUM, Linn.; F. B. I. v. 639. *C. tuberculatum*, Cham.; Wt. Ic. t. 1948, fig. 3. *C. muricatum*, Cham.; Wt. Ic. t. 1948, figs. 1 and 2. *C. missionis*, Wall.; Wt. Ic. t. 1948, fig. 4.

In all Districts, in still water.

A fragile alga-like herb 6 in.—3 ft. long. *Leaves* 5—1 in. long. *Fruit* up to 2 in. long, smooth, muricate or minutely tubercled.

Family CXLIII. GNETACEAE.

Trees or shrubs, sometimes climbing; branches jointed at the nodes. *Leaves* opposite, large and green or minute and scale-like; stipules 0. *Flowers* monoecious or dioecious, in axillary or terminal bracteate spikes or cones. *Perianth* of ♂ tubular, entire or valvately 2—4-lobed or spathaceous, of ♀ 0. *Stamens* connate in a column; anthers 2—8, globose, 1—3 celled, sessile or subsessile on the apex of the column. *Ovule* naked, erect, with a styliiform tube with a discoid

mouth. *Seed* dry or drupaceous; albumen copious or scanty; embryo straight; cotyledons appressed; radicle long, superior.

***Gnetum*, Linn.**

Evergreen trees or climbing shrubs. *Leaves* large, entire, penninerved. *Flowers* monoecious, whorled in the axils of cupular bracts in solitary or paniced spikes. *Perianth* of ♂ narrowly clavate, entire or valvately 2-fid. *Staminal column* adnate to the base of the perianth, apex exserted; anthers of 2 distinct cells, sessile, opening by terminal slits. *Ovule* ovoid or globose; styliform tube exserted, mouth often toothed or fimbriate. *Seed* drupaceous.

GNETUM SCANDENS, Roxb.; F. B. I. v. 642. *G. funiculare*, B. Sm.; Wt. Ic. t. 1955.

In the Ghâts of both sides of the Peninsula, 500—5,000 ft.

A large, robust climber. Bark thick, brown, rough with scales. Leaves ovate-oblong or elliptic, obtusely acuminate, shining, 3—7 in. long, 1·75—4 in. wide; petioles 3—5 in. long. Fruit ellipsoid, pointed or blunt, 1—1·5 in. long, reddish-orange when ripe. Vern. *Tam.* Ana-pendu.

Family CXLIV. CONIFERAE.

Trees or shrubs; resin-canals in the wood frequent. *Leaves* usually alternate or fascicled, rarely opposite, usually rigid, linear or subulate, rarely broad. *Flowers* monoecious or dioecious, ♂ in deciduous catkins, ♀ solitary or in cones. *Perianth* absent in both sexes. ♂ of many 1- or more-celled anthers seated on the scales of the catkin, sessile or with connate filaments; ♀ of 1 or more naked sessile ovules seated on scales usually forming a cone, rarely solitary. *Seeds* often winged; albumen densely fleshy; embryo axile, straight; cotyledons 2 or more; radicle terete.

***Podocarpus*, L'Hérit.**

Evergreen trees or shrubs. *Leaves* opposite or alternate, linear or broad with a midrib or with many parallel nerves. ♂ *flowers* solitary, fascicled or spicate, with imbricate bracts; anthers sessile, spirally crowded, 2-celled, connective with an apical claw or appendage. ♀ *flowers* solitary or few and spicate, bract fleshy, forming a peduncle to the fleshy ovuliferous scale to which the reflexed ovule is adnate. *Seed* small, globose or ovoid, seated on the enlarged fleshy scale and bract; cotyledons 2.

PODOCARPUS WALLICHIANA, Presl. *P. latifolia*, Wall. Pl. As. Rar. t. 30; F. B. I. v. 649; Bedd. Fl. Syl. t. 257.

W. Ghâts from the Nilgiris southwards, 3,000—5,000 ft.

A tall evergreen, glabrous tree. Bark smooth, mottled brown and white; wood grey, aromatic, moderately hard. Leaves opposite or subopposite, coriaceous, lanceolate, tapering at both ends, 3—7 in. long, 1·75—2 in. wide; petiole very short, flat. *Seed*

solitary, ovoid, 1 in. long, seated on a fleshy receptacle. Vern. *Tam.* Nirambali, Narambali; *Kad.* Karunthumbi.

Several conifers have been successfully planted in the Nilgiri and Pulney Hills, e.g. *Cupressus torulosa*, Don, *Pinus radiata* (*insignis*), Don, *Cryptomeria japonica*, Don, *Callitris* (*Frenela*) *rhomboidea*, R. Br.

Family CXLV. CYCADACEAE.

Shrubs or small branchless but sometimes forked trees with a terminal crown of leaves, or stemless with the leaves arising from a tuberous simple or branched rootstock. *Leaves* in alternate series of short coriaceous scales and palm-like pinnate (rarely 2—3-pinnate) leaves with membranous or coriaceous leaflets, often spinous. *Flowers* dioecious, in both sexes naked on scales or modified leaves more or less arranged in cones. *Anthers* sessile and crowded on the undersides of fleshy flat or peltate scales, 1-celled. *Ovules* on the margins of carpellary leaves (*carpophylls*) crowded round the apex of the stem, or on flat or thickened peltate scales arranged in cones, large, sessile. *Seeds* large, drupaceous; albumen copious, fleshy or horny, with 1 or more embryonic cavities; embryo usually single by abortion, slender; radicle superior; cotyledons 2.

Cycas, Linn.

Shrubs or trees; trunk clothed with the woody bases of the petioles. *Leaves* pinnate, linear-oblong in outline; leaflets numerous linear, 1-nerved, quite entire, lower often reduced to spines. ♂ *cones* apparently terminal, peduncled; scales cuneate, closely imbricate, the apex often long-acuminate. *Anthers* ellipsoid in groups of 3—5. *Carpophylls* numerous, crowded round the apex of the stem, at first appressed into an apparently terminal cone, later spreading, elongate, flattened, expanded apically into an entire, crenate or pectinate blade, densely woolly. *Ovules* 1—5 on either side of the carpophyll below the blade, distant, alternate in notches along the margins. *Seeds* ellipsoid or globose.

Small palm-like trees. Leaves 5—9 ft. long; petioles 1·5—2 ft. long with short distant spines at right angles to the petioles or slightly deflexed, to near the glabrous base; leaflets 6—12 in. long, 3—5 in. wide, blunt or acute, not spinous-acuminate, margins flat; acumen of all the antheriferous scales upturned; blade of carpophyll ovate-lanceolate, long-acuminate, margins pectinate; ovules 3—5 on either side; seeds ovoid-oblong, 1—1·5 in. long.....1. *circularis*. Low shrubs, stem only a few inches high. Leaves about 3 ft. long; petioles about 6 in. long, the upper one-third with a few minute spines, base clothed with tufted tomentum; leaflets 4—7 in. long, about 1·5 in. wide, spinous-acuminate, margins strongly revolute; acumen of the antheriferous scales of the upper half of the cone strongly deflexed; blade of carpophyll usually narrow-lanceolate, long-acuminate; margins dentate-lobate; ovules 2 on either side; seeds globose, 1·5 in. in diam.....2. *Beddomei*.

1. *CYCAS CIRCINALIS*, Linn.; F. B. I. v. 656.

In all Districts in deciduous forests, sea-level to 4,000 ft.

A small evergreen palm-like tree up to 25 ft. high. Bark brown, smooth below, tessellated above by the small diamond-shaped

scars of fallen leaves. The leaves are used for plaiting into mats. Vern. *Ur.* Oruna, Rengua; *Tel.* Per-ita, Pairi-ita; *Tam.* Madana-kaman, Katu-thuvai; *Mud.* Pei-ithu; *Mal.* Kalanga, Intha. *Kan.* Goddu-ichel.

2. *CYCAS BEDDOMEI*, Dyer in Trans. Linn. Soc. ii, 5, 85, t. 17; F. B. I. v. 658.

So far only found in the hills of the Cuddapah District, 1,000—3,000 ft.

A small shrub. Bark brown, exfoliating in rectangular scales exposing a yellow under-surface. Vern. *Tel.* Perita.

C. Rumphii, Miq., much resembling *C. circinalis*, is grown in gardens.

MONOCOTYLEDONES.

Family CXLVI. HYDROCHARITACEAE.

Aquatic herbs, usually submerged. *Leaves* undivided. *Flowers* monoecious or dioecious, rarely 2-sexual, enclosed in an entire or 2-leaved spathe; ♂ 1-many, ♀ solitary. *Calyx* of 3 green or petaloid sepals. *Petals* membranous or 0. *Stamens* 3—12; anthers 2-celled. *Ovary* inferior, 1-celled, placenta parietal, intruded and sometimes almost meeting; ovules numerous; styles or style-arms 3—12. *Fruit* globose or ovoid, membranous or fleshy, rarely dehiscent. *Seeds* exalbuminous; embryo various.

Fresh-water herbs; leaves tufted, whorled, opposite or alternate:—

Stems branched, leafy:—

Leaves mostly whorled; perianth double, styles undivided.....1. **Hydrilla**.

Leaves mostly alternate; perianth single; styles notched.....2. **Lagarosiphon**.

Stemless or with stolons, leaves tufted, radical:—

Leaves without a distinct petiole, linear, grass-like; flowers very slender; spathe not winged:—

Perianth single; peduncle of ♀ spathe spirally coiled.....3. **Vallisneria**.

Perianth double; peduncle not coiled.....4. **Blyxa**.

Leaves distinctly petioled, mostly broad, not grass-like; flowers large and broad; spathe winged.....5. **Ottelia**.

Salt-water herbs; leaves 2 at each node from the axil of a scarious or hyaline scale.....6. **Halophila**.

1. **Hydrilla**, Rich.

Submerged leafy fresh- or brackish-water herbs. *Leaves* short, 3—4-nately whorled or the lower opposite entire or toothed. *Flowers* monoecious or dioecious. ♂ *flowers* minute, shortly pedicelled, solitary in a sessile subglobose muricate spathe. *Sepals* 3, ovate to orbicular, concave, green. *Petals* 3, oblong or cuneiform. *Stamens* 3, anthers large, reniform. *Pistillode* minute. ♀ *flowers* sessile, solitary in a cylindric 2-toothed spathe, produced into a long filiform neck above the ovary. *Sepals* and *petals* as in the ♂, but narrower. *Ovary* shorter than the spathe, 1-celled; ovules many, anatropous; styles 2—3, linear, entire; stigmas fimbriate. *Fruit* subulate, smooth or muricate. *Seeds* 2—3, minute, oblong; testa shortly produced at both ends.

HYDRILLA VERTICILLATA, Royle; F. B. I. v. 659. *Serpicula verticillata*, Linn. f.; Roxb. Cor. Pl. t. 164.

In still waters in all Districts from the coast up to high levels.

A slender submerged weed up to 18 in. long, with fibrous roots.

2. Lagarosiphon, Harv.

Submerged fresh-water herbs. *Leaves* alternate or sometimes fascicled and subverticillate and the lower opposite, serrulate or entire. *Flowers* dioecious; ♂ minute, numerous in an axillary, sessile, ovoid, 2-fid spathe; ♀ solitary sessile in a narrow oblong spathe. *Sepals* 3, petaloid, broadly oblong, pink. *Petals* 3, rather shorter. *Stamens* 2 or 3, often with 2 or 3 staminodes added; filaments short, anthers ovate. *Pistillode* 0. *Staminodes* 0 in ♀. *Ovary* oblong, produced into a long filiform beak; ovules many, orthotropous; styles 3, notched, stout. *Fruit* ovoid, oblong or linear. *Seeds* numerous, testa with a mucous coat.

LAGAROSIPHON ALTERNIFOLIA, Druce. *L. Roxburghii*, Benth.; F. B. I. v. 659. *Vallisneria alternifolia*, Roxb.; Wt. Ill. t. 11.

In tanks in all Districts.

Very similar to the last species.

3. Vallisneria, Linn.

Submerged tufted, stemless, stoloniferous fresh-water herbs. *Leaves* very long, linear. *Flowers* dioecious; ♂ minute, very many together in a shortly peduncled, ovoid, 3-lobed spathe; ♀ solitary in a tubular 3-toothed spathe at the end of a very long filiform spirally coiled scape. *Sepals* 3. *Petals* 0. *Stamens* 1—3; anthers didymous. *Pistillode* 0. *Staminodes* in ♀ 3, 2-fid. *Ovary* narrow, not produced upwards; stigmas 3, broad, notched. *Fruit* linear, included in the spathe. *Seeds* numerous, oblong, testa membranous.

VALLISNERIA SPIRALIS, Linn.; F. B. I. v. 660; Wt. Ill. tt. 23 and 24.

A common weed rooting at the bottom of pools and tanks in all Districts.

4. Blyxa, Noronha ex Thouars.

Submerged stemless, tufted, scapigerous herbs. *Leaves* linear, acute, entire or minutely serrulate. *Flowers* dioecious or 2-sexual, on long or short scapes; ♂ pedicelled, several in a tubular 2-toothed spathe ♀ and ♂ sessile, solitary in a 2-toothed spathe. *Sepals* 3, linear. *Petals* 3, linear, longer. *Stamens* 3—9, 1 or more rudimentary; anthers narrow, erect. *Pistillodes* 3, slender. *Staminodes* in ♀ 0 or minute. *Ovary* very slender, beaked; style very short; stigmas 3, filiform. *Fruit* linear, very slender, included in the narrow, ribbed spathe. *Seeds* numerous, oblong; testa membranous, smooth, tubercled or echinate, often tailed at both ends.

Leaves as broad at the base as in the middle or broader:—

Flowers dioecious; stamens 8. Leaves 8—24 in. long, .25—5 in. wide. Fruit 2—4 in. long, about .15 in. wide. Seeds small, tubercled, shortly tailed at each end.....1. *octandra*.

Flowers 2-sexual; stamens 3:—

- Leaves 6—48 in. long, .12—5 in. wide. Fruit 2—3 in. long, about .1 in. wide. Seeds spinescent with a long tail at each end, sometimes .5 in. long, including the tails.....2. *echinosperma*.
 Leaves 3—24 in. long, .2—5 in. wide. Fruit 1.5—2 in. long, about .12 in. wide. Seeds smooth or obscurely tubercled, tailless.....3. *ceylanica*.
 Leaves narrowed from the middle downwards, 4—6 in. long, .12—4 in. wide. Flowers dioecious. Fruit 1—2 in. long, .12 in. wide. Seeds echinate with a short tail at each end.....4. *Talboti*.

1. *BLYXA OCTANDRA*, Planch. *B. Roxburghii*, Rich.; F. B. I. v. 660.
Vallisneria octandra, Roxb. Cor. Pl. t. 165.
 In still waters in all Districts.
2. *BLYXA ECHINOSPERMA*, Hook. f.; F. B. I. v. 661.
 In still water on the West Coast; S. Kanara (Barber), Cochin (Meebold).
3. *BLYXA CEYLANICA*, Hook. f.; F. B. I. v. 661.
 In still water at Udumanparai, Anamalai Hills (Barber), Poombari Valley, Pulney Hills (Bourne).
4. *BLYXA TALBOTI*, Hook. f.; F. B. I. v. 661.
 In still water; Sadras, S. Kanara (Fischer), N. Malabar (Barber).

5. *Ottelia*, Pers.

Submerged fresh-water herbs. *Leaves* radical, crowded, the submerged ones usually different from and narrower than the floating; length of petiole depending on the depth of the water. *Flowers* 2-sexual, solitary, sessile in a tubular, long-peduncled spathe. *Sepals* 3, linear. *Petals* 3, larger. *Stamens* 6—15 in 3—5 whorls, often unequal, some often rudimentary; anthers erect. *Ovary* oblong or fusiform, beaked, sometimes almost 6-celled by the intrusion of the walls; ovules numerous, scattered on the placentæ and walls; styles 6—9, linear. *Fruit* oblong, enclosed in the spathe. *Seeds* numerous.

OTTELIA ALISMOIDES, Pers.; F. B. I. v. 662. *Damasonium indicum*, Willd.; Roxb. Cor. Pl. t. 185.

Common in tanks and sluggish streams in all Districts, sea-level to 3,500 ft.

A flaccid water-herb varying in height with the depth of the water. Leaves of 2 kinds; submerged shortly petioled and usually narrow or oblong and tapering to the base, the floating ones oblong or orbicular, cordate or rounded at the base and then narrowed into the angled petiole, up to 7 in. in diam., 7—11-nerved, margins undulate. Spathe 5—6-toothed, with 5—6 wavy crisped wings, attenuate or caudate at the base, 1—1.5 in. long, about .75 in. in diam. Petals obovate or orbicular with fleshy basal appendages, white. Ovary oblong, beaked; styles 2-fid. Fruit 6-valved. Seeds oblong with a pulpy testa. Vern. *Tel. Nir-veneki*.

6. *Halophila*, Thouars.

Submerged marine plants. *Leaves* in pairs at each node from the axil of a scarious or hyaline scale. *Flowers* solitary or 2 together in a sessile spathe of 2 bracts from between the petioles. *Sepals* 3.

Petals 0. *Stamens* 3; anthers nearly sessile, alternate with the sepals, linear-oblong. *Pistillode* 0. *Ovary* ovoid, long-beaked; ovules many on 2 parietal placentæ; styles 3, filiform, papillose all over. *Fruit* subglobose, beaked, included in the spathe. *Seeds* many, subglobose, testa membranous; embryo thick, with the spiral cotyledons in a cavity at the side.

HALOPHILA OVATA, Gaud.; F. B. I. v. 663.

Along the coast and in back-waters.

A slender, creeping herb. Leaves linear-oblong to ovate, penninerved, up to 3 in. long and .75 in. wide; petiole long, slender.

♂ flowers pedicelled; ♀ sessile. Sepals minute.

Family CXLVII. BURMANNIACEAE.

Small erect herbs. *Leaves* chiefly radical, linear, entire or reduced to scales or 0. *Flowers* 2-sexual, regular, solitary or spicate or racemose on one side of a forked cyme, each opposite a bract. *Perianth* superior, persistent, corolline, 6- or 3-lobed, lobes valvate. *Anthers* 3 or 6, included, 2-celled, sessile or subsessile on the perianth. *Ovary* inferior, 3-celled or 1-celled with 3 parietal placentæ; ovules numerous; style 1, short; stigmas various. *Fruit* capsular, sometimes dehiscent irregularly. *Seeds* numerous, minute, testa reticulate; albumen scanty; embryo minute.

Burmattia, Linn.

Annual herbs. *Leaves* ensiform, acuminate, radical, often reduced to scales or 0. *Flowers* 1, few or many, unilateral on the branches of a forked cyme. *Calyx-tube* winged or angled, wings narrow or obcordate, 3-lobed. *Petals* smaller or 0. *Anthers* 3, sessile or subsessile, cells short, separated by a broad connective, dorsally crested. *Ovary* 3-celled; style 3-lobed.

Plant leafy, robust; radical leaves many, ensiform, acute, 1—3 in. long, .25—.5 in. wide; flowers .5—.75 in. long, secund on the branches of an erect, forked cyme

1. *disticha*.
Plant leafless or nearly so, slender; radical leaves, when present, scale-like, .2—.7 in. long; flowers .25—.5 in. long, solitary or 2—6 together.....2. *coelestis*.

1. *BURMANNIA DISTICHA*, Linn.; F. B. I. v. 664.

Vizagapatam District at Ventala, 4,500 ft. (A. W. Lushington).

Up to 18 in. high; leaves radical and clothing the stem, gradually reduced upwards to lanceolate bracts .65—1.5 in. long; flowers bright blue.

2. *BURMANNIA COELESTIS*, Don.; F. B. I. v. 665. *B. pusilla*, Thw.; F. B. I. 665. *B. candida*, Griff. MSS. ex Hook. f. F. B. I. v. 665.

Mahendragiri (Fischer) and on the West Coast from low elevations (Nedungayam in S. Malabar at 150 ft.—Fischer) up to about 7,000 ft. in the W. Ghâts from Mysore to Travancore.

A slender variable herb 3—15 in. high with 1—5 or 6 small blue flowers and with or without small ensiform radical leaves. The variation appears to be due greatly to the conditions under which it grows, especially the degree of moisture.

Family CXLVIII. ORCHIDACEAE.

Epiphytic or terrestrial herbs, rarely shrubby, sometimes scandent; often tuberous rooted; leafy or leafless. *Leaves* various. *Inflorescence* lateral or terminal. *Flowers* hermaphrodite, from minute to large and showy, solitary or more usually spicate or racemose, sometimes paniced. *Perianth* superior, irregular, of 6 free or variously combined segments in 2 alternating whorls. *Calyx* of 3 similar or dissimilar sepals, 1 dorsal and 2 lateral, the latter often united and forming a basal sac or spur (*mentum*). *Petals* 3, the 2 lateral alike, the third (*lip*) dissimilar. *Stamens* and *style* united into a long or short column opposite the lip, the top sometimes produced towards the lip in a beak (*rostellum*). *Anther* usually single (2 in *Paphiopedilum*) on the front, top or back of the column, 2- or 4-celled, pollengrains usually cohering in each cell into 1, 2 or 4 pairs of oblong, globose or pyriform, waxy or powdery masses (*pollinia*), which are free or adnate in pairs or fours, with or without a stalk (*caudicle*) to a gland. *Ovary* inferior, usually linear and twisted half a turn so that the lip appears inferior, 1-celled; ovules minute; stigma one or two viscid spots on the top or concave face of the column facing the lip and below the anther, sometimes stalked. *Capsule* usually opening by 3 or 6 longitudinal fissures, fruit rarely fleshy and indehiscent. *Seeds* very many, minute; testa lax, enclosing a homogeneous nucleus.

(This key is adapted for use only for the genera and species included in this flora.)

Epiphytic plants:—

Leaves equitant:—

Stem very short, leaves tufted; scape terminal; spike elongate, many-flowered
1. **Oberonia**.

Stem elongate, leaves imbricating throughout; spike short, terminal and lateral,
few-flowered.....37. **Podochilus**.

Leaves not equitant:—

Flowers 2 in. long or longer.....13. **Thunia**.

Flowers 1.5 in. long or shorter:—

Lip not spurred, though base sometimes saccate:—

Flowers with a mentum:—

Mentum formed by the lateral sepals and the foot of the column:—

Column short, straight, not winged:—

Rhizome long, annulate, stem nodose, bearing uninodal pseudobulbs

4. **Desmotrichum**.

Rhizome short, stemless with a single pseudobulb or pseudobulbs

plurinodal.....5. **Dendrobium**.

Column rather long, incurved, more or less winged

8. **Chrysoglossum**.

Mentum formed by the lip and the foot of the column...26. **Kingiella**.

Flowers without a mentum:—

Column with a distinct foot:—

Lip clawed, jointed to the foot and more or less mobile:—

Scape lateral, flowers not paniced:—

Sepals subequal.....6. **Bulbophyllum**.

Dorsal sepal much shorter than the lateral (rarely half as long)

7. **Cirrhopetalum**.

Scape terminal, flowers paniced.....23. **Polystachya**.

Lip sessile, not jointed or mobile:—

Pseudobulbs discoid; sepals connivent at the base, lateral, at least,
connate.....9. **Porpax**.

Pseudobulbs not discoid; sepals free.....10. **Eria**.

Column without a foot:—

Bracts imbricating, convolute, almost concealing the flowers

17. *Pholidota*.

Bracts not imbricate nor concealing the flowers:—

Lip not lobed:—

Leaves flat:—

Scape terminal; column long.....3. *Liparis*.

Scape lateral; column very short.....38. *Thelasis*.

Leaves terete.....24. *Luisia*.

Lip more or less 3-lobed:—

Stem very short or 0; leaves basal or from the apex of a

pseudobulb:—

Flowers paniced.....15. *Josephia*.

Flowers simply racemed:—

Apex of leaves entire.....16. *Coelogyne*.

Apex of leaves 2-lobed.....21. *Cymbidium*.

Stem elongate; leaves distichous.....25. *Cottonia*.

Lip-spurred:—

Lip with a single conical or saccate spur:—

Plant leafless, at least when flowering:—

Column with a distinct foot bearing the lateral sepals

28. *Chilochista*.

Column without a foot.....35. *Taeniophyllum*.

Plant leafy:—

Foot of column distinct, usually long.....29. *Aerides*.

Foot of column 0 or indistinct:—

Spur vertically septate almost to the mouth.....33. *Sarcanthus*.

Spur not septate:—

Spur distant from the base of the lip.....27. *Rhynchostylis*.

Spur at the base of the lip:—

Mouth of the spur open:—

Sepals and petals distinctly narrowed to the base.....30. *Vanda*.

Sepals and petals not distinctly narrowed to the base:—

Slender plants; leaves not thickly coriaceous; spur as long

as or longer than the rest of the lip.....31. *Saccolabium*.

Robust plants; leaves thickly coriaceous; spur shorter than

the rest of the lip.....32. *Acampe*.

Mouth of the spur almost closed by a horizontal plate from

the back wall.....34. *Cleisostoma*.

Lip with 2 small collateral spurs.....36. *Diplocentrum*.

Terrestrial plants:—

Leafy plants:—

Climbing, fleshy plants.....39. *Vanilla*.

Not climbing plants:—

Flowers without spur or mentum:—

Inflorescence lateral from the stem:—

Racemes few-flowered, flowers gibbously jug-shaped, yellow and red;

column short, foot long.....12. *Acanthophippium*.

Panicles many-flowered, flowers not gibbous nor jug-shaped, greenish-

white; column long, foot short.....40. *Corymborchis*.

Inflorescence terminal on the stem or direct from the rhizome or

pseudobulb:—

Lip superior:—

Spike glabrous:—

Column very short, entire.....2. *Microstylis*.

Column long, margined or winged towards the apex.....3. *Liparis*.

Spike glandular-pubescent.....48. *Hetaeria*.

Lip inferior:—

Spike conspicuously spirally twisted.....44. *Spiranthes*.

Spike straight:—

Leaf single, often appearing after the flowers:—

Leaf narrow, flowers glandular-pubescent

11. *Pachystoma*.

- Leaf cordate or orbicular, flowers glabrous 50. *Nervilia*.
- Leaves 2 or more, appearing with the flowers:—
- Flowers 1 in. long or longer:—
- Flowers red, glabrous; lip triangular-ovate, disk with 3—5 lamellae.....19. *Arundina*.
- Flowers greenish, pubescent; lip narrowly oblong below, lanceolate above, base warted, not lamellate.....53. *Epipactis*.
- Flowers not more than .5 in. long:—
- Lip entire:—
- Scape from the rootstock, raceme decurved 22. *Geodorum*.
- Scape terminating the leafy stem, raceme erect 47. *Goodyera*.
- Lip lobed:—
- Lip saccate at the base:—
- Sepals connate to the middle in a tube 45. *Cheirostylis*.
- Sepals free.....46. *Zeuxine*.
- Lip not saccate at the base, T- or Y-shaped 59. *Disperis*.
- Flowers spurred or with a mentum:—
- Lip not large nor shoe-shaped:—
- Spur 0 or single:—
- Scape lateral:—
- Spur longer than the sepals, lip adnate to the top of the column 18. *Calanthe*.
- Spur 0 or shorter than the sepals, lip adnate to the base of the column:—
- Lateral sepals connate into a mentum with the base of the lip:—
- Column 2-auricled or lobed about the middle 8. *Chrysoglossum*.
- Column not auricled nor lobed.....14. *Tainia*.
- Lateral sepals free, not connate with the lip.....20. *Eulophia*.
- Raceme or spike terminal:—
- Lip superior.....41. *Tropidia*.
- Lip inferior:—
- Lip lobed:—
- Root not tuberous:—
- Lateral sepals free, spur exerted beyond the bases of the sepals.....42. *Anoechtochilus*.
- Lateral sepals connate, concealing the small spur 43. *Odontochilus*.
- Root of 1 or 2 simple or lobed tubers:—
- Sepals subequal and more or less connivent.....55. *Peristylus*.
- Sepals unequal, the lateral spreading or reflexed:—
- Flowers less than 1.3 in. in diameter, stigmas distinctly stalked.....54. *Habenaria*.
- Flowers 2 in. in diameter or more; stigma sessile 56. *Platanthera*.
- Lip entire, obcordate.....57. *Phyllomphax*.
- Spurs 2 from the back of the superior lip.....58. *Satyrion*.
- Lip large, shoe-shaped.....60. *Paphiopedilum*.
- Leafless plants without chlorophyll:—
- Lip clawed.....49. *Aphyllorchis*.
- Lip sessile:—
- Lateral sepals connate.....51. *Didymoplexis*.
- Lateral sepals free.....52. *Epipogon*.

1. *Oberonia*, Lindl.

Small tufted epiphytes. *Leaves* distichous, equitant, coriaceous or fleshy, usually ensiform. *Flowers* minute in dense or interrupted

subcylindric spikes or racemes. *Sepals* subequal, ovate or oblong. *Petals* smaller. *Lip* sessile, concave, entire or 2—4-lobed, sometimes erose. *Column* very short. *Anther* terminal, incumbent; pollinia 4, waxy, cohering by a viscus.

Lip of corolla toothed. Leaves broadly ensiform, 3—8 in. long; spikes slender up to 12 in. long, flowers and capsules sessile; lip more or less quadrate, tip broadly 2-fid.....1. *iridifolia*, var. *denticulata*.

Lip not toothed, subentire or 3-lobed:—

Petals broad, elliptic-oblong or ovate:—

Lip truncate, not lobed. Leaves ensiform, acute, 1—2.5 in. long; racemes about twice as long; flowers numerous, sunk in pits in the rhachis; sepals and petals reflexed on the ovary; lip subquadrate with an obscure rounded auricle at each side of the base.....2. *Proudlockii*.

Lip obcordate or 3-lobed:—

Side lobes of lip undeveloped:—

Lip twice as long as the sepals, obcordate with rounded lobes separated by a narrow sinus, side lobes absent. Leaves narrow-ensiform, acute or acuminate, 2—5.5 in. long; racemes slender, long; flowers pedicelled, usually whorled.....3. *verticillata*.

Lip only slightly longer than the sepals, oblong with 2 short, narrow, acute lobes separated by a broad sinus; side lobes small, rounded or tooth-like. Leaves broadly ensiform, acute, 1—3 in. long; racemes rather stout; flowers shortly pedicelled, not whorled.....4. *Falconeri*.

Side lobes of lip broad or long:—

Leaves 6—18 in. long, coriaceous, acuminate; spike dense-flowered, shorter than the leaves; lip broad, rounded, mid-lobe obcordate.....5. *ensiformis*.

Leaves 1—2 in. long, acuminate; spike dense-flowered, 2—3 in. long; lip erose, lateral lobes rounded, midlobe 2-fid.....6. *recurva*.

Petals linear:—

Lip quadrate, entire or obscurely lobed at the outer angles. Leaves linear-ensiform, obtuse, up to 6 in. long; scape about as long as the leaves, flattened, usually with a small adnate leaf about the middle; flowers shortly pedicelled, loosely imbricated.....7. *zeylanica*.

Lip distinctly lobed:—

Scape adnate to the upper leaf:—

Lip orbicular with a 2-lobed apical auricle. Leaves ensiform, up to 12 in. long, acute; spike stout, flattened, flowers sessile, densely imbricated; lip with a concave disk.....8. *Brunoniana*.

Lip with broad rounded lateral lobes and a short 2—3-fid midlobe. Leaves ensiform, up to 12 in. long; scape flat, very broad, adnate to the upper leaf to the top; flowers sessile, about 2 in. in diam. (the largest of the genus in India), densely imbricated.....9. *platycaulon*.

Scape not adnate to the upper leaf:—

Midlobe of lip much smaller than the lateral lobes, broad. Leaves ensiform, obtuse, 3—6 in. long; scape stout, flattened; flowers sessile, densely imbricated; lip broadly 3-lobed, crenate, gland-dotted.....10. *Lindleyana*.

Midlobe of lip much longer than the lateral, narrow. Leaves linear-oblong or narrow-ensiform, acute, 1.5—5 in. long; scape terete, racemes slender, longer than the leaves; flowers shortly pedicelled, whorled or loosely imbricated; lateral lobes of lip large, oblong or rounded; midlobe narrow with diverging lobes, sometimes minutely toothed at the ends

11. *Wightiana*.

1. OBERONIA IRIDIFOLIA, Lindl. var. DENTICULATA, Hook. f.; F. B. I. v. 676. *O. denticulata*, Wt. Ic. t. 1625.

W. Gháts; Rampa Hills (Gamble).

Flowers dull-orange.

2. OBERONIA PROUDLOCKII, King & Pantl.

Nilgiri Hills near Gudalur (Proudlock).

Flowers reddish-brown.

3. *OBERONIA VERTICILLATA*, Wt. Ic. t. 1626; F. B. I. v. 677.
W. Gháts; Salem Hills (Bourne).
Sepals pale-green, petals and lip dull-orange.
4. *OBERONIA FALCONERI*, Hook. f.; F. B. I. v. 678; Duthie Ann. Calc. ix. 2. t. 94.
Mysore Hills at 3,500 ft. (Meebold); Rampa Hills at 2,000 ft. (V. Narayanswami), Vizagapatam Hills at 2,400 ft. (A. W. Lushington).
Flowers greenish-yellow.
5. *OBERONIA ENSIFORMIS*, Lindl.; F. B. I. v. 679; King & Pantl. Ann. Calc. viii. t. 9.
W. Gháts; Rampa Hills (Gamble, V. Narayanswami), Vizagapatam Hills, 2,500—4,000 ft. (A. W. Lushington).
Flowers orange-yellow.
6. *OBERONIA RECURVA*, Lindl.; F. B. I. v. 680.
Travancore (M. Rama Rao).
Flowers green.
7. *OBERONIA ZEYLANICA*, Hook. f.; F. B. I. v. 680.
Anamalai Hills at 4,000 ft. (Fischer).
Flowers pale.
8. *OBERONIA BRUNONIANA*, Wt. Ic. t. 1622; F. B. I. v. 681.
W. Gháts.
Sepals and lip dark-brownish, petals pale-yellowish.
9. *OBERONIA PLATYCAULON*, Wt. Ic. t. 1623; F. B. I. v. 682.
Nilgiri and Pulney Hills.
Flowers whitish or pale-yellow.
10. *OBERONIA LINDLEYANA*, Wt. Ic. t. 1624; F. B. I. v. 681.
W. Gháts.
Flowers straw-coloured, lip dull-orange.
11. *OBERONIA WIGHTIANA*, Lindl.; F. B. I. v. 683; Wt. Ic. t. 1627. *O. Arnotiana*, Wt. Ic. t. 1628.
W. Gháts.
Flowers pale yellowish-green.

2. *Microstylis*, Nutt.

Terrestrial or epiphytic herbs, pseudo-bulbous or not. *Leaves* 1 or more, continuous with their sheaths. *Flowers* small, in terminal racemes, resupinate. *Sepals* spreading or recurved. *Petals* as long as but narrower than the sepals. *Lip* adnate to the base of the column, usually flat, sides often produced upwards beyond the column. *Column* very short with short spreading apical arms. *Anther* subterminal; *pollinia* 4.

Sides of lip produced upwards into large acute or obtuse auricles, apex notched. Herb 3—12 in. high; stem 1—3 in. long; leaves several, ovate or lanceolate, acute, 2—6 in. long; bracts shorter than the ovary.....1. *Wallichii*.

Sides of lip not produced upwards into auricles, apex pectinate:—

Lip obovate or reniform:—

Stem stout, 3—6 in. long; root without pseudobulb; leaves 3—5, petioled, broadly ovate or elliptic, acute, 3—7 in. long.....2. *versicolor*.

Stem slender, short, root pseudobulbous; leaves 2, rarely 3, sessile or nearly so, ovate to lanceolate, acute or obtuse, 1—3 in. long; racemes dense-flowered

3. *densiflora*.

Lip widely fan-shaped. Stem stout or slender, 2—4 in. long; leaves 2—3, shortly petioled, broadly ovate or ovate-lanceolate, acute or acuminate, 1·5—4 in. long; flowers comparatively large; lip rather deeply pectinate.....4. *Stocksii*.

1. *MICROSTYLIS WALLICHII*, Lindl.; F. B. I. v. 686; Hook. f. Ann. Calc. v. t. 2; King & Pantl. Ann. Calc. viii. t. 18.

W. Ghâts; Pykara, Nilgiris (Barber), Anamalais (Beddome).

A terrestrial herb; flowers purplish or yellowish.

2. *MICROSTYLIS VERSICOLOR*, Lindl. *M. Rheedii*, Wt. Ic. t. 902; F. B. I. v. 690.

W. Ghâts from 6,000 ft. upwards.

A terrestrial herb; flowers greenish-yellow or purplish.

3. *MICROSTYLIS DENSIFLORA*, Fischer n. comb. *M. versicolor*, Wt. Ic. t. 901; F. B. I. v. 691. *M. luteola*, Wt. Ic. t. 1632; F. B. I. v. 691.

W. Ghâts at high elevations.

Very like *M. versicolor*, Lindl., but smaller and more slender and the root always bulbous.

4. *MICROSTYLIS STOCKSII*, Hook. f.; F. B. I. v. 691.

W. Ghâts at high elevations.

A terrestrial herb; flowers yellow.

3. *Liparis*, L. C. Rich.

Terrestrial or epiphytic herbs, often pseudobulbous. *Leaves* 1 or more, often jointed on the sheath or pseudobulb. *Flowers* small or minute, in terminal racemes, resupinate. *Sepals* spreading, recurved or revolute, margins often revolute. *Petals* as long, very slender. *Lip* adnate to the base of the column, usually broad, deflexed from a very short base, or recurved. *Column* long, usually incurved, margined or winged towards the tip. *Anther* terminal; pollinia 4.

Leaves membranous, continuous with the sheath or pseudobulb:—

Stems slender, short:—

Lip broad, entire:—

Lip orbicular-obovate, column short, thick. Leaves 2, ovate or ovate-lanceolate, acute, 4 in. long, 3 in. wide; scape and raceme up to 12 in. long; bracts lanceolate, acuminate, as long as the pedicel; lip shortly clawed, margin crenulate; column short, thick, with long, narrow, obtuse wings.....1. *platyphylla*.

Lip orbicular or orbicular-oblong; column long, slender, sigmoidally incurved:—

Leaves 2, ovate-lanceolate, acuminate, 1·5—2 in. long; scape and raceme 2—4 in. long; bracts lanceolate, $\frac{3}{4}$ the length of the pedicel and ovary; lip with 2 minute calli, margin entire; column very obscurely winged

2. *Wightiana*.

Leaves 2, ovate-lanceolate, acuminate, 1 in. long, $\frac{1}{2}$ in. wide; scape and raceme slender, 2 in. long; bracts minute, $\frac{1}{4}$ length of pedicel and ovary; column very slender, arcuate, minutely winged.....3. *Beddomei*.

Lip cuneate, 2-lobed; leaves 2—3, ovate, acute, 1 in. long, $\frac{1}{2}$ — $\frac{3}{4}$ in. wide, they and the stem often purple; scape and raceme about 1·5 in. long; lip shortly clawed, with 2 basal tubercles, lobes oblong or lanceolate, obtuse; column slender, curved, with small obtuse wings.....4. *biloba*.

Stems stout, 2—5 in. long:—

Leaves 2—5, lanceolate or elliptic-lanceolate, acuminate, 2·5—5 in. long, $\frac{1}{2}$ —1·75 in. wide; stem slightly bulbous at the base; scape angular, with the raceme 4—10 in. long; flowers about $\frac{1}{3}$ in. across; lip cuneately obovate or subquadrate, usually recurved, tip truncate or slightly obcordate

with a minute apiculus, with 2 basal calli; column incurved with 2 small rounded wings.....5. *nervosa*.

Leaves ovate or orbicular, lip not cuneate:—

Leaves 2—3, acute or acuminate, 2—7 in. long, 1·5—4 in. wide, base equilateral; scape and raceme 3—6 in. long; flowers about ·25 in. across; lip orbicular, recurved, crenulate, base contracted, 2-tubercled; column incurved with hooked wings.....6. *Walkeriae*.

Leaves 3—4, acute or acuminate, 2—7 in. long, 1·5—4·5 in. wide, base very oblique, one side rounded or auricled and the other acute; scape and raceme 4—9 in. long; flowers about ·33 in. across, lip orbicular-obovate, recurved, crenulate, base contracted and with 2 large tubercles; column very slender, curved, with rounded wings.....7. *atropurpurea*.

Leaves usually coriaceous, jointed on the sheath or pseudobulb:—

Leaf solitary on the pseudobulb:—

Leaf linear-lanceolate, acute, 2—4 in. long, ·2—5 in. wide; scape and raceme 3—6 in. long; flowers about ·12 in. across; lip broadly oblong, recurved, rounded, entire or notched, base 2-auricled; column short, stout, obscurely winged.....8. *pusilla*.

Leaf elliptic or linear-lanceolate, acute, ·75—2 in. long, ·15—25 in. wide; scape and raceme 1—2 in. long, flowers ·06 in. across; lip quadrately-oblong, recurved, truncate-crenate, base hardly auricled; column short, curved, obscurely winged.....9. *Duthiei*.

Leaves 2—4:—

Leaves 2; lip as long as the lateral sepals or nearly so:—

Leaves narrowly obovate-oblong or oblanceolate, acute or acuminate, 4—12 in. long, ·7—1·25 in. wide; scape and raceme 6—10 in. long, naked below or with 1 or 2 ensiform bracts; flowers about ·08 in. across; lip broadly ovate, subacute, recurved; column with rounded, unappendaged wings.....10. *longipes*.

Leaves narrowly elliptic-lanceolate or oblanceolate, 2—5 in. long, ·6—9 in. wide; scape and raceme 4—6 in. long, with several filiform bracts on the scape; pedicels recurved; flowers about ·15 in. across; lip orbicular-ovate, recurved, subacute, very obscurely 3-lobed; column short, incurved, unappendaged.....11. *viridiflora*.

Leaves 3—4; lip minute, much shorter than the sepals; pseudobulbs tufted, 0·5—1 in. long; leaves linear-lanceolate, acuminate, 1·3—5 in. long, ·2—4 in. wide; scape and raceme up to 9 in. long, with many bracts about ·33 in. long on the scape; flowers ·25—·35 in. across; lip broadly ovate-oblong, basal lobes rounded, 2-tubercled, tip broad, rounded; column broadly winged, wings with a capillary tail.....12. *resupinata*.

1. LIPARIS PLATYPHYLLA, Ridl.; F. B. I. v. 695.
Anamalai Hills, 3,500 ft. (Beddome).
A small terrestrial herb.
2. LIPARIS WIGHTIANA, Thw.; F. B. I. v. 695. *L. atropurpurea*, Wt. Ic. t. 904.
Pulney Hills, 6,000 ft. (Wight, Anglade); Travancore (Beddome); High Wavy Mountains (Blatter & Hallberg).
A small, delicate, pseudobulbous, terrestrial herb; flowers white, lip dull-purple, or whole flower purple.
3. LIPARIS BEDDOMEI, Ridl.; F. B. I. v. 695.
Shembaganur, Pulney Hills at 5,000 ft. (Beddome).
Lip green with a purple disk spot.
Very like and doubtfully separable from the last species.
4. LIPARIS BILOBA, Wt. Ic. t. 1633; F. B. I. v. 699.
Nilgiri Hills (Wight, King).
A small, pseudobulbous, terrestrial herb. The whole plant often purplish; flowers very dark purple.

5. *LIPARIS NERVOSA*, Lindl. *L. paradoxa*, Reichb. f.; F. B. I. v. 697 and vi. 181; King & Pantl. Ann. Calc. viii. t. 34.
 Nilgiris and Anamalai Hills at 3,000 ft. (Beddome).
 A pseudobulbous terrestrial herb 6—15 in. high; flowers green, tinged with pink or yellow-brown.
6. *LIPARIS WALKERIAE*, Grah.; F. B. I. v. 698.
 W. Gháts, 6,000—7,500 ft.
 A pseudobulbous, terrestrial herb; flowers pale- to dark-purple, lip with a yellowish margin.
7. *LIPARIS ATROPURPUREA*, Lindl.; F. B. I. v. 698. *L. olivacea*, Wt. Ic. t. 903. *L. Walkeriae*, Wt. Ic. t. 905.
 W. Gháts at high elevations.
 A pseudobulbous terrestrial herb; flowers dark vinous-purple.
8. *LIPARIS PUSILLA*, Ridl.; F. B. I. v. 701; King & Pantl. Ann. Calc. viii. t. 41.
 Anamalai Hills (Beddome); Peermade in Travancore at 4,500 ft. (Meebold).
 A small, pseudobulbous, epiphytic herb; flowers white.
9. *LIPARIS DUTHIEI*, Hook. f.; F. B. I. v. 701; King & Pantl. Ann. Calc. viii. t. 42.
 Nilgiri Hills (Proudlock).
 A very small, pseudobulbous, epiphytic herb; flowers yellowish.
10. *LIPARIS LONGIPES*, Lindl.; Wall. Pl. As. Rar. t. 196; F. B. I. v. 703; Wt. Ic. t. 906; King & Pantl. Ann. Calc. viii. t. 37.
 Courtallam (Wight); Cochin (Johnson); Peermade at 4,500 ft. (Meebold); Shevaroy Hills (Bourne); Tinnevely Hills (Beddome); Coorg (Bourne).
 A pseudobulbous, epiphytic herb; flowers white, lip yellow.
11. *LIPARIS VIRIDIFLORA*, Lindl.; F. B. I. v. 704; King & Pantl. Ann. Calc. viii. t. 47. *L. elliptica*, Wt. Ic. t. 1735.
 Nilgiri Hills (Wight); Pulney Hills (Bourne); High Wavy Mountains (Blatter & Hallberg).
 A pseudobulbous, epiphytic herb; flowers white, yellowish or green.
12. *LIPARIS RESUPINATA*, Ridl.; F. B. I. v. 705; King & Pantl. Ann. Calc. viii. t. 48.
 Nilgiri Hills (Wight).
 A small epiphytic herb; flowers yellow.

4. *Desmotrichum*, Blume.

Epiphytic herbs with annulate creeping rhizomes and pendulous nodose stems bearing narrowly fusiform uninodal pseudobulbs at irregular intervals. *Leaves* sessile, terminal on the pseudobulbs, solitary or paired. *Flowers* fugacious, 1—3 together from near the base of the leaf. *Bracts* scarious. *Lateral sepals* adnate to the foot of the column to form a mentum. *Lip* narrowed at the base, lobed; apex expanded, more or less fimbriate or sinuate.

DESMOTRICHUM FIMBRIATUM, Blume. *Dendrobium Macraei*, Lindl.; F. B. I. v. 714; Ann. Calc., King & Pantl. viii. t. 86.
 W. Gháts.

Stems smooth and polished, up to 3 ft. long; pseudobulbs 1—2·5 in. long, shining; leaves linear-oblong, obtuse, 2—8 in. long; flowers 75—1 in. long, white or pinkish and speckled with red, the midlobe of the lip greenish-yellow.

5. *Dendrobium*, Swartz.

Epiphytic herbs. Stems elongate nodose or of pseudobulbs; pseudobulbs basal or on the stem, uni- or pluri-nodal. *Leaves* sessile, never plicate; bases sheathing, arising from the top of the pseudobulb or from the nodes of the stem. *Flowers* solitary, fasciated or in racemes from the top of the pseudobulbs or axillary, often large. *Sepals* subequal, the lateral adnate to the foot of the column to form a mentum. *Petals* similar. *Lip* sessile, contracted at the base, rarely clawed, adnate to and incumbent on the foot of the column; side lobes, if present, embracing the column or spreading; terminal lobe various, its disk often lamellate. *Column* short, angled or 2-toothed at the top, foot usually long. *Anther* 2-celled; pollinia 4, free or nearly so, ovoid or oblong, compressed, waxy.

Stemless; leaves from the top of a uninodal pseudobulb:—

Pseudobulb ovoid, 5—7·5 in. long; leaves usually 2, rather thick, oblong-lanceolate, acute, 2—3 in. long, 25—7 in. wide; flowers 4—10 in a raceme from the top of the pseudobulb; scape slender, 1—3 in. long; bracts equalling the pedicel and ovary combined; lip suborbicular, 3-lobed, side lobes small, subacute, midlobe truncate or slightly emarginate, crenulate, disk 2-keeled; keels fleshy, apiculate.....1. *microbulbon*.

Pseudobulb ovoid, 25—5 in. long; leaves 2—4, elliptic-lanceolate, obtuse or subacute, 1—2·5 in. long, 2—5 in. wide; flowers 8—10 in a raceme; scape slender, 1·5—3 in. long from the top of the pseudobulb; bracts shorter than the pedicels; lip long-clawed, limb suborbicular, serrulate, side lobes small, midlobe rounded, disk with a broad, depressed, fleshy, truncate ridge

2. *nanum*.

Stems elongate, plurinodal; pseudobulbs 0 or on the stem; leaves from the nodes:—

Flowers in elongate, few- to many-flowered racemes:—

Racemes very slender, usually few-flowered:—

Rhizome small, stem flexuous; leaves linear-lanceolate, acute, 2—4 in. long; sheaths usually broad and lax; racemes mostly axillary, flexuous, usually longer than the leaves; flowers 5 in. long; side lobes of lip acute, midlobe rounded, crenate, disk with a channelled ridge ending in a fleshy callus

3. *Heyneanum*.

Rhizome slender, creeping; stem slender, straight; leaves narrowly linear, acute, 1—3 in. long; sheaths narrow, closely embracing the stem; racemes all terminal, usually straight and shorter than the leaves; flowers 3—5 in. long; side lobes of lip small, spreading, midlobe oblong, crenate, disk flat

4. *graminifolium*.

Racemes stout, many-flowered:—

Leaves lanceolate or oblong-lanceolate, acute, 2—4 in. long, 25—5 in. wide; flowering shoots leafless; racemes lateral and terminal; flowers 4—6 in. long; bracts ovate, acute, scarious; lateral sepals oblong-lanceolate, subacute, dorsal oblanceolate, obtuse, mentum acute, 2 in. long, lip flat, side lobes small, rounded, midlobe large, subquadrate, disk with a channelled ridge, pubescent.....5. *ovatum*.

Leaves lanceolate, acute, 3—4 in. long, 5 in. wide; flowering shoots leafless; racemes lateral and terminal; flowers about 1 in. long; bracts very small, lanceolate, scarious; lateral sepals lanceolate, acute, slightly falcate, dorsal

linear-lanceolate, acute, mentum acute, .33 in. long, lip flat, 3-lobed, side lobes obtuse, midlobe rhomboid-ovate, acute or apiculate, bearded at the base with yellow hairs.....6. *barbatulum*.

Flowers solitary, fascicled or in very short racemes:—

Flowers racemed:—

Stems pendulous, copiously branched, polished and shining, naked below; branchlets leafy; leaves narrowly linear-lanceolate, acute or subobtusely, 1—4.5 in. long, .2—5 in. wide; racemes terminal, rarely reaching 1 in. long, 2—3-flowered; bracts very small, scarious; flowers .25 in. long, sepals oblong-lanceolate, subacute, mentum minute, lip oblong, side lobes 0 or very narrow, midlobe ovate, entire, subacute.....7. *herbaceum*.

Stems simple, tufted; racemes lateral:—

Stems erect, clavate or swollen above:—

Stems clavate or narrowly fusiform, elongate; leaves elliptic-oblong to elliptic-lanceolate, acute, apex minutely obliquely bifid, 1.5—3.5 in. long, .4—1 in. wide; sheaths glabrous; flowers .3—4 in. long, crowded, capitate on a short lateral rhachis or in a subterminal raceme; peduncle short, sheathed; bracts as long as and sheathing the short pedicel and the ovary; sepals and petals subequal, concave, mentum urceolate, lip small, fleshy, concave, broad-triangular, 3-lobed, side lobes triangular, acute, erect, midlobe very small, truncate.....8. *bicameratum*.

Stems slender below, slightly swollen above; leaves coriaceous, linear-lanceolate to linear-oblong, acute or obtuse, more or less deeply cleft at the apex, 1—3 in. long, .2—4 in. wide; sheaths (at least the upper) nigro-hirsute; flowers .7—1.3 in. long, 2—4, in short leaf-opposed racemes; peduncle not sheathed; bracts minute, much shorter than the filiform pedicel; sepals and petals linear-lanceolate, acute, mentum conical, half as long as the sepals, lip fleshy, as long as the sepals, linear-oblong, side lobes small, midlobe elongate, margins crisped.....9. *nutans*.

Stems many, pendulous, terete, usually slender; leaves membranous, linear-lanceolate to ovate-lanceolate, acute, 2—4 in. long, .4—9 in. wide; flowers .7—1 in. long, in short 2—4-flowered lateral racemes; bracts small, ovate, scarious; pedicels long, slender; sepals and petals equal in length, acute, sepals oblong-lanceolate, petals linear-lanceolate, lip longer, ovate-oblong, long-clawed, finely pubescent, margins crenulate, side lobes small, rounded or nearly absent, mid-lobe quadrately ovate, obtuse...10. *macrostachyum*.

Flowers fascicled or solitary:—

Flowers 2—4 from a leaf-opposed tubercle bursting through the sheath below the mouth; stem pendulous, slender, leafy above the base; leaves rigidly papery, linear; apex oblique, obtuse, 3—5 in. long, .2—35 in. wide; sheaths tight, striate; flowers .3—4 in. long, excluding the ovary; pedicels slender, bracts small, cupular; petals as long as, but broader than the sepals, lip tongue-shaped, entire, acute, undulate.....11. *haemoglossum*.

Flowers not on tubercles:—

Lip narrower than long; stems subclavate, suberect, ribbed except the slender polished 1 or 2 lowest internodes; leaves narrowly oblong-lanceolate, apex oblique, subacute, 3—5 in. long, .5—9 in. wide; flowers 1—3 on a very short peduncle, axillary on the leafless stems, 1.2—1.4 in. long; sepals linear-oblong, acute, petals ovate-lanceolate, acuminate, mentum long, conical, truncate, lip ovate-lanceolate, acute, sides incurved at the base, disk pubescent.....12. *heterocarpum*.

Lip as broad as or broader than long:—

Stems slender, pendulous, leafy below the flowers, usually naked above; leaves lanceolate, acuminate, 2—4 in. long, .5—1.2 in. wide; flowers 2—3 on short peduncles from the node, 1—1.3 in. long; sepals oblong-lanceolate, subacute, petals broader, oblong, mentum conical, lip orbicular, cucullate, pubescent and ciliate, base tubular by the incurving sides.....13. *aphyllum*.

Stems subclavate, compressed, rather thick, decumbent, leafy throughout; leaves ovate-lanceolate, acuminate, 2.5—7 in. long, .5—1.75 in. wide; flowers 2—3 from the leaf axils, 1—1.3 in. long; sepals ovate, subacute, petals obovate, mentum short, obtuse, lip rhombic, pubescent, crose, side lobes small, incurved, midlobe broadly triangular...14. *aqueum*.

1. *DENDROBIUM MICROBULBON*, A. Rich.; F. B. I. v. 716. *D. humile*, Wt. Ic. t. 1643.
W. Gháts.
A small epiphyte 2—4 in. high; sepals and petals white, lip pink with darker veins.
2. *DENDROBIUM NANUM*, Hook. f.; F. B. I. v. 717.
Hills of Mysore and Coorg (Bourne), Nilgiris, Anamalais at 7,500 ft. (Fischer), Shevaroy's (Bourne), High Wavy Mountains (Blatter & Hallberg).
Very similar to the last species; "lip green, turning yellow with age, with 2 median pink-purple patches" (Bourne).
3. *DENDROBIUM HEYNEANUM*, Lindl.; F. B. I. v. 718; Wt. Ic. t. 909.
W. Gháts: Nilgiris, Bolampatti Hills at 4,800 ft. (Fischer), Courtallam (Wight), Tinnevely Hills (Barber).
Stem 4—8 in. high; flowers white.
4. *DENDROBIUM GRAMINIFOLIUM*, Wt. Ic. t. 1649; F. B. I. v. 718.
Anamalai (Beddome), Nilgiri (Wight), Travancore and Tinnevely Hills, near sea-level to 2,000 ft.
Very like the last species. Growing on rocks as well as on trees; flowers white.
5. *DENDROBIUM OVATUM*, Krzl. *D. chlorops*, Lindl.; F. B. I. v. 719. *D. barbatulum*, Wt. Ic. t. 910.
W. Gháts and the West Coast from 150—5,000 ft.
4—20 in. high, the stem sometimes very stout; flowers cream-coloured, lip greenish.
6. *DENDROBIUM BARBATULUM*, Lindl.; F. B. I. v. 719.
W. Gháts from Mysore to Travancore.
6—15 in. high; flowers white, often suffused with pink.
7. *DENDROBIUM HERBACEUM*, Lindl.; F. B. I. v. 719. *D. ramosissimum*, Wt. Ic. t. 1648.
W. Gháts from 2,000—4,000 ft.
Stems 2—3 ft. long; flowers yellow.
8. *DENDROBIUM BICAMERATUM*, Lindl.; F. B. I. v. 729; King & Pantl. Ann. Calc. viii, t. 56.
Mahendragiri in Ganjam at 4,500 ft. (Gamble).
Stems 3—18 in. long; flowers yellow, marked with red.
9. *DENDROBIUM NUTANS*, Lindl.; F. B. I. v. 734; Hook. f. Ann. Calc. v. t. 18. *D. Jerdonianum*, Wt. Ic. t. 1644; F. B. I. v. 734.
Throughout the W. Gháts, 2,000—6,000 ft.
Stems 5—18 in. long; flowers yellow.
Var. *rubrilabris*, Blatter. Flowers white; lip pink, spotted purple, mid-lobe very strongly crisped. High Wavy Mountains (Blatter and Hallberg).
10. *DENDROBIUM MACROSTACHYUM*, Lindl.; F. B. I. v. 735; Wt. Ic. t. 1647.
W. Coast and W. Gháts, up to 7,000 ft.
Leafy stems 1—2 ft. long, flowering stems often much longer; flowers pale-green or yellow often tinged with pink.
11. *DENDROBIUM HAEMOGLOSSUM*, Thw.; F. B. I. v. 727.
Malabar (Jerdon), Wynaad. Rare.
Stems 12—18 in. long; flowers yellow, tip tinged with dark red.

12. *DENDROBIUM HETEROCARPUM*, Wall. Pl. As. Rar. t. 196; F. B. I. v. 737. *D. aureum*, Lindl.; Wt. Ic. t. 1646.
W. Ghâts from 3,000—5,500 ft.
Stems 9—18 in. long; flowers white or straw-coloured, disk of lip with 2 red or purple blotches.
13. *DENDROBIUM APHYLLUM*, Fischer n. comb. *D. Picardi*, Roxb.; F. B. I. v. 738; Wt. Ic. t. 908; King & Pantl. Ann. Calc. viii. t. 72. *Limodorum aphyllum*, Roxb.; Cor. Pl. t. 41.
Coromandel (Roxb.), Coorg (Lancaster).
Stems 2—3 ft. long; flowers pale-rose, the lip yellow.
14. *DENDROBIUM AQUEUM*, Lindl.; F. B. I. v. 739. *D. album*, Wt. Ic. t. 1645.
W. Ghâts, 3,000—7,000 ft.
Stems 10—20 in. long; flowers white, the lip suffused with pale-yellow.

6. *Bulbophyllum*, Thouars.

Epiphytic herb with 1- (rarely 2-) leaved pseudobulbs on a creeping (rarely lacking) rhizome. *Scapes* from the rhizome, usually close to the pseudobulb. *Flowers* solitary, capitate, umbellate, spicate or racemose. *Sepals* subequal or the lateral slightly longer than the dorsal, not cohering together, adnate to the foot of the column. *Petals* usually distinctly smaller than the dorsal sepal. *Lip* usually tongue-shaped, sessile or clawed, jointed on the foot, mobile, usually small and much recurved. *Column* short, often 2-aristate at the top. *Anther* 2-celled, pollinia 4 (rarely 2).

Flowers umbellate:—

Rhizome stout, pseudobulbs broadly ovoid, .5—7 in. long; leaf elliptic-oblong, 1—3 in. long, obtuse, emarginate, narrowed into a short petiole; scape rather stout, sheaths 2—3; flowers 4—8, .6—7.5 in. long; sepals lanceolate, acuminate, dorsal $\frac{1}{2}$ shorter, petals elliptic-oblong, rounded, lip clawed, basal angles acute

1. *albidum*.

Rhizome stout; pseudobulbs distant, quadrangular ovoid, .75—1 in. long; leaf linear-oblong, obtuse, 3—4 in. long; scape slender, 3—4 in. long, 4—5-flowered; sepals narrow-lanceolate, long acuminate, .5—6 in. long, dorsal a little shorter, petals elliptic-oblong, about $\frac{1}{2}$ as long as the dorsal sepal.....2. *mysorensis*.

Flowers racemose:—

Lip glabrous with recurved lateral basal auricles:—

Flowers 1 in. or more long; sheaths and bracts large, coloured. Rhizome stout; pseudo-bulbs ovoid, 1—1.5 in. long; leaf oblong, obtuse, 2—7 in. long; scape stout, longer than the leaf; raceme few-flowered, drooping; sepals subequal, ovate-oblong, acuminate, petals very small, ovate, tipped with a capillary awn clavate at the tip, lip sessile, broad, papillose.....3. *pusco-purpureum*. Flowers .4 in. or less long; sheaths and bracts small, hyaline. Rhizome stout, pseudobulbs ovoid, 1—2 in. long; leaf narrowly elliptic to broadly oblong, 2—6 in. long, rounded or subacute, base narrowed; scape stout, shorter or longer than the leaf; racemes many-flowered, erect; sepals oblong, dorsal broad-ovate, petals triangular-ovate, lip with entire or toothed auricles

4. *neilgherrensis*.

Lip linear-oblong fringed with long hairs, without auricles. Rhizome slender; pseudobulbs subglobose, .4—5 in. in diam.; leaf sessile, ovate-lanceolate, acute or obtuse, 1.5—2 in. long, base rounded; scape slender, very much longer than the leaf; bracts small, narrow; flowers 6—10, about .5 in. long; sepals subequal, linear-lanceolate, ciliate, petals very small, fringed.....5. *tremulum*.

1. *BULBOPHYLLUM ALBIDUM*, Hook. f.; F. B. I. v. 757. *Cirrhopetalum albidum*, Wt. Ic. t. 1653.
W. Gháts.
Flowers cream-coloured, freckled with pale-brown.
2. *BULBOPHYLLUM MYSORENSE*, J. J. Smith.
Hills of Mysore.
Flowers nearly white, the lip purple.
3. *BULBOPHYLLUM FUSCO-PURPUREUM*, Wt. Ic. t. 1651; F. B. I. v. 760.
W. Gháts.
Flowers dark purple.
4. *BULBOPHYLLUM NEILGHERRENSE*, Wt. Ic. t. 1650; F. B. I. v. 761.
W. Gháts.
Flowers brownish-yellow or greenish-purple.
5. *BULBOPHYLLUM TREMULUM*, Wt. Ic. t. 1749 (excluding insertion of scape on the apex of the pseudobulb); F. B. I. v. 763.
Coorg (Jerdon), Agalhatti in Mysore at 3,500 ft. (Meebold), Nilgiri and Anamalai Hills (Beddome).
Flowers yellow passing to purple at the tips, lip purple.

7. *Cirrhopetalum*, Lindl.

Epiphytic herbs with 1-leaved pseudobulbs from a usually creeping rhizome. *Scapes* from the rhizome close to the pseudobulb. *Flowers* umbelled or very shortly racemed. *Sepals* markedly unequal, dorsal concave, ovate, acute, lateral rarely less than twice as long, acuminate, twisted to bring the outer margins together and usually coherent, at least towards the apex even though separated below, bases adnate to the sides of the column or its foot. *Petals* shorter or longer than the dorsal sepal. *Lip* short, tongue-shaped, recurved, jointed to the foot and very mobile. *Column* very short, 2-aristate at the top, foot upcurved.

Flowers umbelled, rarely reduced to 1 or 2 flowers:—

Dorsal sepal and petals fimbriate. Rhizome short; pseudobulbs clustered, ovoid, angular, about .5 in. long; leafless when flowering; leaf oblong-lanceolate, acute, 3—5 in. long, scape slender, 2.8 in. long, sheaths 2—3; flowers numerous; lateral sepals linear, acute, 1—1.25 in. long, cohering, dorsal .25 in. long, ovate with a long tail, petals .12 in. long.....1. *fimbriatum*.

Dorsal sepal and petals glabrous, quite entire:—

Umbel reduced to 2 flowers. Rhizome slender, pseudobulbs distant, ovoid, .6 in. long; leaf linear-oblong, 1.5—2 in. long; scape slender, shorter than the leaf; pedicels long; lateral sepals ovate-oblong, subacute, .66 in. long, at first cohering, later separate, dorsal sepal suborbicular, .22 in. long, petals oblong, obtuse, as long as the dorsal sepal.....2. *aureum*.

Umbel more than 2-flowered:—

Lateral sepals linear-lanceolate, acuminate, .75—1 in. long. Rhizome slender; pseudobulbs distant, ovoid, .75—1 in. long; leaf linear-oblong, obtuse, 3—4 in. long; scape slender, 2—4 in. long, many-flowered; dorsal sepal ovate, acute, $\frac{1}{2}$ as long as the lateral, petals broadly oblong, shorter than the dorsal sepal.....3. *neilgherrense*.

Lateral sepals less than .6 in. long:—

Lateral sepals linear-oblong or falcate-lanceolate, .5 in. long, cohering throughout, puberulous near the base. Rhizome slender; pseudobulbs distant, ovoid, about .5 in. long; leaf linear-oblong, 1—3 in. long; scape very slender, 1—3 in. long; dorsal sepal broadly ovate, $\frac{1}{2}$ as long as the lateral, petals broadly oblong.....4. *Gamblei*.

Lateral sepals linear-lanceolate, $\frac{1}{4}$ in. long, cohering above, free below.
Pseudobulb ovoid, $\frac{3}{4}$ —1 in. long; dorsal sepal oblong, obtuse, nearly $\frac{1}{2}$
as long as the lateral, petals orbicular, oblong, obtuse, minute

5. *elegantulum*.

Flowers shortly racemed:—

Lateral sepals $\frac{1}{2}$ in. long or less:—

Rhizome rather stout, pseudobulbs ovoid, $\frac{1}{2}$ —1 in. long; leaf oblong, obtuse or emarginate, 1—2.5 in. long; leaves with the flowers; scape slender, as long as or longer than the leaf, 6—8-flowered; sheaths 2—3; lateral sepals linear-lanceolate, acuminate, 2—3 times longer than the falcately ovate-lanceolate, long-acuminate dorsal, petals broadly oblong, obtuse, $\frac{1}{4}$ as long as the dorsal sepal.....6. *acutiflorum*.

Rhizome slender; pseudobulbs crowded, subglobose or broadly ovoid, $\frac{1}{2}$ in. long; leafless when flowering (leaf unknown); scape slender 1—2.5 in. long, 6—10-flowered; sheaths 1—2; lateral sepals oblong, obtuse, in contact but not cohering, twice as long as the oblong, subacute dorsal, petals triangular, aristate, much shorter than the dorsal sepal.....7. *Proudlockii*.

Lateral sepals linear-lanceolate, cohering except at the base, 1—1.2 in. long. Rhizome very stout, slightly swollen at the nodes; pseudo-bulbs oblong or ovate-oblong, 1.75—2 in. long; leaf linear-oblong, obtuse, base attenuate, 5—6 in. long; scape 3—4 in. long, 6—7-flowered; dorsal sepal ovate-oblong, acute, minutely denticulate, $\frac{1}{3}$ in. long, petals broadly ovate, subacute, erose, $\frac{1}{5}$ in. long.....8. *nodosum*.

1. CIRRHOPETALUM FIMBRIATUM, Lindl. ; F. B. I. v. 774 ; Wt. Ic. t. 1655.
Coorg (Jerdon).
Flowers green or cream-coloured with darker lines and red cilia ;
lip red.
2. CIRRHOPETALUM AUREUM, Hook. f. ; F. B. I. v. 777.
Wynaad (Jerdon).
Flowers golden-yellow.
3. CIRRHOPETALUM NEILGHERRENSE, Wt. Ic. t. 1654 ; F. B. I. v. 778.
Nilgiri (Wight, Gamble) and Anamalai Hills at 4,000—5,000 ft.
(Beddome).
Flowers yellow, mottled with red.
4. CIRRHOPETALUM GAMBELI, Hook. f. ; F. B. I. v. 778. *C. Thomsoni*,
Hook. f. ; F. B. I. v. 778.
Nilgiri, Anamalai, Pulney Hills and High Wavy Mountains
(Blatter & Hallberg).
Flowers yellow, variously tinged and mottled with red or purple.
5. CIRRHOPETALUM ELEGANTULUM, Rolfe.
Coorg.
Flowers yellow with maroon-purple stripes.
6. CIRRHOPETALUM ACUTIFLORUM, A. Rich. ; F. B. I. v. 779.
W. Ghâts.
Flowers greenish-white or cream-coloured.
7. CIRRHOPETALUM PROUDLOCKII, King. & Pantl.
Nilgiri Hills, Gudalur Ghât at 4,000 ft. (Proudlock).
Flowers pale straw-coloured.
8. CIRRHOPETALUM NODOSUM, Rolfe.
Nilgiri Hills.
Flowers reddish-brown, densely speckled in a darker tint.

8. *Chrysoglossum*, Blume.

Terrestrial or epiphytic herbs. *Pseudobulbs* narrow or 0, 1-leaved. *Leaves* elliptic-lanceolate, plaited. *Scapes* lateral on the rhizome, long, erect, sheathed. *Flowers* laxly racemed. *Sepals* subequal, lateral connate with the base of the lip into a mentum. *Petals* subequal to the sepals. *Lip* erect, broadly 3-lobed, sometimes auriculate at the base; disk 3-lamellate. *Column* incurved, margins 2-auricled or -lobed about the middle; foot short. *Anther* 2-celled; *pollinia* 2, free.

Terrestrial; rhizome stout; leaf 6—14 in. long, 1·5—4 in. wide, acuminate, tapering into a 1—5 in. petiole which thickens into a narrow pseudobulb, 1—3 in. long; scape and raceme usually longer than the leaf, up to 20 in. long, many-flowered; sheaths loose, ·5—1 in. long; bracts ·5 in. long; flowers ·75—1 in. long; sepals and petals oblong, falcate, subacute.....1. *maculatum*. Epiphytic; rhizome slender; leaf 7 in. long, 2 in. wide, narrowed into the 3—4 in.-long petiole, which thickens into a narrow 1—1·5 in.-long pseudobulb; scape and raceme as long as the leaf, about 12-flowered; sheaths 3, loose; bracts linear, ·5 in. long, longer than the pedicel and ovary; flowers about ·33 in. long; sepals and petals obovate-lanceolate to lanceolate, acute, the petals broader...2. *Hallbergii*.

1. *CHRYSOGLOSSUM MACULATUM*, Hook. f.; F. B. I. vi. 784.

Pulney Hills (Bourne); Agastirmalai in Tinnevely (Barber).

Flowers green with purple markings, lip white with purple spots.

2. *CHRYSOGLOSSUM HALLBERGII*, Blatter in Journ. Bomb. Nat. Hist. Soc. xxxii, 519.

High Wavy Mountains (Blatter & Hallberg).

9. *Porpax*, Lindl.

Very small epiphytic herbs. *Pseudobulbs* subdiscoid or button-like, clothed with reticulate sheaths. *Leaves* 2, membranous. *Flowers* 1—3, subsessile on the top of the pseudobulb. *Sepals* connivent at the base, all connate into a tube or the dorsal free, lateral sepals oblique below and adnate to the long foot of the column. *Petals* small, free, usually shorter than the sepals. *Lip* sessile on the foot of the column, incumbent. *Column* short, wingless. *Pollinia* usually 8, attached in fours.

Pseudobulbs ·75 in. in diam.; leaves caducous, broadly oblong, under 1 in. long; flowers solitary from between the leaves with sheaths and an orbicular parchment-like bract at the base, ·4—·5 in. long; sepals all connate into a 3-lobed subcampanulate tube, petals included, spatulate, lip panduriform, crenulate, shortly clawed, with a basal, erect, tooth-like process.....1. *reticulata*. *Pseudobulbs* ·4—·6 in. in diam.; leaves persistent, suborbicular, ·4—1·25 in. long, minutely ciliate; flowers 1—3 from between the leaves with many sheaths and a broad ciliate bract at the base, 2-lipped, 33 in. long; lateral sepals connate to above the middle, concave, pubescent, dorsal sepal nearly free, broadly oblong, petals linear-spatulate, very small, lip minute, shortly clawed, ovate-cordate, toothed, apiculate.....2. *Jerdoniana*.

1. *PORPAX RETICULATA*, Lindl. *Eria reticulata*, Benth.; F. B. I. v. 786.

Aggeianthus marchantioides, Wt. Ic. t. 1737.

Iyamalai Hills (Wight), Donipoya in South Malabar at 700 ft. (Fischer).

Pseudobulbs aggregated on wet rocks or on tree-trunks; flowers purple-brown.

2. PORPAX JERDONIANA, Reichb. *Eria Lichenora*, Lindl.; F. B. I. v. 787. *Lichenora jerdoniana*, Wt. Ic. t. 1738.

Bababudan Hills (Law), Hills of Malabar (Jerdon), Travancore (Johnson).

Pseudobulbs aggregated on branches of trees; flowers yellowish.

10. *Eria*, Lindl.

Epiphytic herbs, usually pseudobulbous. *Pseudobulbs* often elongate and stem-like. *Flowers* never very large nor bright coloured, 1 or 2 or racemed or spicate. *Sepals* free, adnate to the foot of the column to form a short or long and spur-like or saccate mentum. *Petals* subsimilar to the lateral sepals. *Lip* sessile on the foot, rarely shortly clawed, incumbent. *Column* short and straight or long and little curved. *Anther* imperfectly 4- or 8-celled; pollinia usually 8, pyriform.

Pseudobulbs simple, plant stemless or stems short, unjointed:—

Flowers solitary, .75—1 in. long. *Pseudobulbs* depressed-globose, enclosed in a net-like sac; leaves 2, oblong- or elliptic-lanceolate, acute, .75—3 in. long; scape slender, 1—1.75 in. long; bract below the flower suborbicular, strongly nerved, .33 in. long; lateral sepals falcate, acute, dorsal oblong-lanceolate, slightly longer, petals like the lateral sepals, lip as long as the lateral sepals, 3-lobed

1. *braccata*.

Flowers racemed:—

Small plants less than 4 in. high; leaves less than 3 in. long; scapes slender:—

Pseudobulbs globose or ovoid; flowers not secund, .1 in. or less long:—

Leafless when in flower (leaves unknown); scape capillary, flexuous, glabrous; bracts boat-shaped; lateral sepals decurved, bill-hook-shaped, obtuse, dorsal oblong, obtuse, slightly longer, petals linear-obovate, shorter than the lateral sepals, lip minute.....2. *exilis*.

Leafy when in flower; leaves oblong-lanceolate, acute, base attenuate, 1—2.5 in. long; scape not flexuous, brown-pubescent, as are the pedicels and ovaries; bracts oblong-lanceolate, acute; lateral sepals obliquely semi-ovate, subacute, dorsal lanceolate-oblong, subobtuse, petals linear-lanceolate, lip rhomboid-suborbicular.....3. *albiflora*.

Pseudobulbs depressed-ovoid; flowers secund, .25 in. or more long:—

Leaves 2, oblanceolate-oblong, subobtuse, 1—2.7 in. long; scape few-flowered, up to 5 in. long; bracts lanceolate; flowers under .3 in. long; sepals lanceolate, acute, dorsal slightly longer, petals subsimilar, lip very small, ovate-lanceolate.....4. *Dalzellii*.

Leaves 2—3, elliptic-lanceolate, obtuse or acute, 1—2.5 in. long; scape 2—6-flowered, often flexuous, up to 5 in. long; bracts ovate; flowers .4—6 in. long; sepals linear-lanceolate, acuminate, petals subsimilar, lip shortly clawed, ligulate.....5. *nana*.

Larger plants exceeding 4 in. high; leaves 4—8 in. long; scapes comparatively stout:—

Pseudobulbs ovoid, thick, 2—4 in. long; leaves 3—5, linear-, elliptic- or oblong-lanceolate, acute; scapes 2—4 on a pseudo-bulb, 2—4 in. long, many-flowered, with the pedicels and flowers externally more or less fuliginose-pilose; flowers .25—.3 in. long; lateral sepals and petals subequal, lanceolate, slightly falcate, dorsal sepal slightly longer, lip entire, ovate-subpanduriform, subacute.....6. *polystachya*.

Pseudobulbs thick, ovoid, 1—1.5 in. long; leaves 1—4, linear- to oblong-lanceolate, subacute or obtuse; scapes 4—5 in. long, many-flowered, slightly pubescent; flowers .5—.75 in. long, glabrous; sepals lanceolate, dorsal a little longer, petals linear-lanceolate, about as long as the lateral sepals, lip ovate-subcordate, acute.....7. *pubescens*.

Pseudobulbs pluri-articular or developed into a plurinodal stem:—

Internodes 1 in. or less long:—

Stem 3—6 in. high from a creeping rootstock, slender below, clavate above; internodes 5—1 in. long; leaves 2—3 from the apex of the stem, linear-oblong, 1.5—5 in. long, obtuse or subacute; scape from between the leaves, slender, 1—1.5 in. long, 1—3-flowered; pedicels slender with 2—3 oblong bracteoles; flowers 4—5 in. long; sepals and petals subequal, lateral sepals triangular, slightly falcate, dorsal oblong, petals narrow-oblong, lip cuneately oblong, lobes obscure.....8. *pauciflora*.

Stem 2—3 ft. high, robust, terete; internodes about 1 in. long; leaves numerous from the upper nodes, narrowly elliptic-oblong, acuminate, 4—8 in. long; racemes axillary, as long as or longer than the leaves, many-flowered, rusty pubescent; bracts sub-orbicular, apiculate, 2 in. long; flowers 5—6 in. long, rusty-pubescent outside; sepals subequal, broadly elliptic, the lateral falcate, spreading, petals narrower, lip ovate-oblong, obtuse, side lobes small

9. *bambusifolia*.

Internodes 2 in. or more long. Stems tufted, up to 8 in. long; leaves 3, oblong-lanceolate, acute, about 7 in. long and 1.75 in wide; peduncle from between the leaves up to 8.5 in. long; flowers 2-bracteate; bracts olive, oblong, acute, half amplexicaul; flowers about 6 in. long, dorsal sepal elliptic-oblong, lateral triangular-falcate from a broad base, petals falcate-oblong, lip much shorter than the sepals, broadly ovate, subequally 3-lobed, lobes slightly crisped, midlobe minutely white-puberulous.....10. *pseudoclavicaulis*.

1. ERIA BRACCATA, Lindl.; F. B. I. v. 787. *E. reticosa*, Wt. Ic. t. 1637; F. B. I. v. 787.

W. Ghâts from the Bababudan to the Nilgiri Hills at about 6,000 ft.; High Wavy Mountains (Blatter & Hallberg).

Flowers white, lip edged with purple, column yellow.

2. ERIA EXILIS, Hook. f.; F. B. I. v. 788.

Travancore (Johnson).

A very small, delicate herb.

3. ERIA ALBIFLORA, Rolfe.

Nilgiri Hills.

Flowers pure white.

4. ERIA DALZELLII, Lindl.; F. B. I. v. 789. *Dendrobium filiforme*, Wt. Ic. t. 1642 (central and top left-hand figs.).

W. Ghâts.

Flowers white or yellowish.

- Var. *fimbriata*, Hook. f.; F. B. I. v. 789.

Petals and sepals fringed with translucent gland-tipped hairs.

5. ERIA NANA, A. Rich.; F. B. I. v. 789. *Dendrobium filiforme*, Wt. Ic. t. 1642 (right-hand bottom fig.).

W. Ghâts, 5,000—8,000 ft.

Flowers white.

6. ERIA POLYSTACHYA, A. Rich.; F. B. I. v. 792. *E. mysorensis*, Lindl.; F. B. I. v. 793. *E. pubescens*, Wt. Ic. t. 1635.

W. slopes of the Nilgiri Hills.

Flowers white.

7. ERIA PUBESCENS, Wt. Ic. t. 1634; F. B. I. v. 793.

W. slopes of the Nilgiri Hills (Wight, Barber).

Flowers white, tipped with pink.

8. ERIA PAUCIFLORA, Wt. Ic. t. 1636; F. B. I. v. 799.

Nilgiri, Anamalai (Davidson), Kollimalai (Barber), Tinnevely

(Barber) Hills and High Wavy Mountains (Blatter & Hallberg).
Flowers pure white.

9. *ERIA BAMBUSIFOLIA*, Lindl.; F. B. I. v. 805; King & Pantl., Ann. Calc. viii, t. 163.

Mahendragiri in Ganjam at 4,500 ft. (Gamble).

Flowers pale-brown with darker markings, lip with 3 pale-green ridges, column yellow.

10. *ERIA PSEUDOCLOVICAULIS*, Blatter in Journ. Bomb. Nat. Hist. Soc. xxxii, 518.

High Wavy Mountains (Blatter & Hallberg).

Flowers white, tinged with pink.

11. *Pachystoma*, Blume.

Terrestrial herbs; rhizome nodose. *Leaves* 1 or 2, long, narrow, appearing after flowering-time. *Scape* pale, with many sheaths. *Flowers* racemed, pendulous, moderate-sized. *Sepals* and *petals* sub-equal; lateral sepals adnate to the base of the column. *Lip* sessile at the base of the footless column. *Column* slender, clavate upwards. *Anther* dorsal, 4-celled; pollinia 8, pyriform.

PACHYSTOMA SENILE, Reichb. f.; F. B. I. v. 812; King & Pantl. Ann. Calc. viii. t. 140. *Apaturia Lindleyana*, Wt. Ic. t. 1662.

Western Ghâts, 3,000—5,000 ft.

Leaf solitary; scape with raceme 8—30 in. long; sheaths 5—2 in. long; flowers about 5 in. long, glandular pubescent, white, greenish or pinkish; bracts scarious, longer than the flowers, strongly nerved.

12. *Acanthophippium*, Blume.

Terrestrial herbs with 2—9-leaved pseudobulbs. *Leaves* petioled, broad, plicate. *Flowers* few, large, on short, lateral racemes. *Sepals* broad, cohering into a ventricose tube with recurved tips, lateral adnate to the foot of the column to form a large, saccate mentum. *Petals* erect, narrow, included. *Lip* small, stipitate on the foot of the column, inflexed, lateral lobes broad, mid-lobe recurved, entire, disk with a complex callus. *Column* short, stout; foot very long, inflexed. *Anther* 2-celled; pollinia 8, erect, cohering by a granular mass.

ACANTHOPHIPPIUM BICOLOR, Lindl.; F. B. I. v. 815.

Nilgiri Hills (Proudlock); Machur Shola in the Lower Pulney Hills (Bourne); Shevaroy Hills (Bourne). Very rare.

A robust plant. Pseudobulb oblong-ovate, corrugated, 1—2 in. long, clothed in the remains of old leaves; stem 3—8 in. long; leaves 2 or 3, oblong-lanceolate, acuminate, tapering into a sheathing petiole, 6—18 in. long, 1.5—4.5 in. wide. *Scape* sheathed, 3—7-flowered; bracts ovate-lanceolate, 1 in. long; flowers 1.5 in. long, resembling broad gibbous-based jugs, yellow tipped or spotted with red; side lobes of lip hatchet-shaped, midlobe short, tongue-shaped, disk 3-keeled.

13. *Thunia*, Reichb. f.

Epiphytic or terrestrial herbs; stems not pseudobulbous, leafy with foliaceous sheaths below. *Leaves* distichous. *Flowers* in racemes terminating the stem, large; bracts large, scarious. *Sepals* erectopate, subequal, lanceolate, acute. *Petals* similar. *Lip* adnate to the base of the column, shortly spurred, side lobes short, embracing the column, midlobe fringed. *Anther* narrow, pendulous, incompletely 4-celled; pollinia 8, waxy, attached in fours to a granular membrane.

THUNIA VENOSA, Rolfe. *Phajus albus*, Lindl. in part; F. B. I. v. 818. Travancore (Calder and Ramaswami).

An epiphytic herb, stem 6—18 in. long; leaves linear-ensiform, 3—9 in. long; raceme drooping, 3—5 in. long; flowers few, white, 2 in. long; lip 1·2 in. long, side lobes involute, crisped, midlobe spreading, waved, often ciliate, palate with 5 longitudinal rows of long, erect, flat, purple papillæ which sometimes unite into membranes, column long, winged, broadening to the denticulate apex.

14. *Tainia*, Blume.

Terrestrial herbs with 1-leaved pseudobulbs. *Flowers* racemose, small or medium-sized. *Sepals* narrow, the lateral falcate, adnate to the saccate base of the lip to form a mentum or inserted above it. *Lip* adnate only by its base to the base of the slender column, hastately 3-lobed, rarely entire, disk lamellate. *Anther* with a simple or 2-lobed boss or 2-horned; pollinia 4 or 8, free or united by a viscus.

TAINIA BICORNIS, Benth.; F. B. I. v. 820. *Ainia latifolia* Wt. Ic. t. 914.

W. Ghâts, rare.

Pseudobulb fusiform, 1—3 in. long. Leaf terminal on the pseudobulb, oblong-lanceolate to broadly elliptic, acuminate, base rounded, 4—7 in. long, 1·5—3·5 in. wide; petiole as long or longer; scape lateral, usually longer than the leaf; bracts lanceolate, acuminate, about ·75 in. long; flowers about 1 in. long, purplish or greenish with a reddish flush, lip and column yellow; sepals linear-lanceolate, acute, petals subequal, side lobes of lip small midlobe, broad, retuse, disk 3-lamellate, the middle one short, almost confined to the midlobe.

15. *Josephia*, Wight.

Practically stemless, tufted, epiphytic herbs with stout root-fibres. *Leaves* radical, coriaceous. *Flowers* small, on the branches of panicked spikes. *Sepals* subequal, concave, connivent. *Petals* as long but narrower. *Lip* erect, fleshy, adnate to the base of the column, concave, side lobes small, incurved, midlobe small, entire, papillose, with a basal callus uniting the side lobes. *Column* erect, broad, nearly as long as the sepals, shortly 2-winged upwards; foot 0. *Anther* acuminate, 2-celled; pollinia 4, oblong, parallel, subcaudate, attached to the rostellum by a viscus.

Leaves linear-oblong or lanceolate, subacute or obtuse, 2—5 in. long, .8—1.2 in. wide; petioles .5—2 in. long, plicate, moderately wide; scapes 3—12 in. long, slender; flowers white, tinged with purple.....1. *lanceolata*.
 Leaves broadly oblong or subrotund; apex rounded, 1.8—3.5 in. long, .9—1.5 in. wide; nearly sessile or petiole up to 1.5 in. long, plicate, wide; scapes 3—12 in. long, slender; flowers yellow with purple stripes.....2. *latifolia*.

1. JOSEPHIA LANCEOLATA, Wt. Ic. t. 1742; F. B. I. v. 823.

W. Gháts.

2. JOSEPHIA LATIFOLIA, Wt. Ic. t. 1743; F. B. I. v. 823.

W. Gháts.

The two are very doubtfully separable.

16. Coelogyne, Lindl.

Epiphytic herbs; rhizome creeping; pseudobulbs 2- (rarely 1-) leaved. *Leaves* coriaceous or thin and plaited. *Flowers* usually racemed, rarely 1 or 2; bracts long, sheathing. *Sepals* subequal, lateral more or less saccate at the base. *Petals* narrower. *Lip* sessile at the base of the column, erect and embracing it, base concave or saccate. *Column* long, erect, winged, apex hooded, membranous; foot 0. *Anther* more or less 2-celled; pollinia 4, cohering in pairs by a granular viscus.

Flowers solitary. Pseudobulbs crowded, ovoid, with loose fibrous sheaths at the base, .6—1.2 in. long; leaves 2, linear to narrowly oblong, acuminate, narrowed into a short petiole, 3—7 in. long, .2—5 in. wide; scape short, sheathed in large scarious imbricate bracts; flowers .6—7 in. long; lip oblong, lateral lobes small, acute, midlobe ovate.....1. *uniflora*.
Flowers racemed:—

Sheaths of the scape not becoming foliaceous:—

Lip 2-keeled:—

Sepals .4 in. long, lip as long or longer. Pseudobulbs crowded, narrowly conical, 1—1.5 in. long; leaves 2, linear to linear-oblong, acute, tapering into a channelled petiole, 4—6 in. long, .4—7 in. wide; scape short, tightly clasped at the base by the short sheaths; bracts large, persistent, scarious, ovate-lanceolate; lip with small, blunt side lobes, midlobe broadly obovate, rounded, apiculate or retuse, keels undulate.....2. *breviscapa*.

Sepals 1 in. long, lip shorter. Pseudobulbs ovoid, 1.25—3 in. long; leaves 2, oblong-lanceolate, acute, 6—8 in. long, 1—1.75 in. wide; bracts .75—1.25 in. long; lip with short triangular-ovate, blunt side lobes, midlobe, elliptic, subobtusely, keels entire.....3. *Mossiae*.

Lip 3-keeled. Pseudobulbs ovoid, about 1 in. long; leaves 2, lanceolate, acute, 4—6 in. long, .6 in. wide, petiole short, channelled; bracts narrow; lip with narrowly ovate, subfalcate side lobes, midlobe suborbicular, retuse or apiculate, keels undulate.....4. *angustifolia*.

Inner sheaths of scape more or less foliaceous:—

Pseudobulbs crowded, subglobose, under 1 in. long; leaves 2, hardly coriaceous, elliptic lanceolate, acute, 1.5—4 in. long, .3—5 in. wide; petiole channelled; scape slender, as long as or longer than the leaves, 2—3 flowered; bracts persistent, lanceolate, .5—6 in. long; flowers .6—7 in. long; lip with small oblong-falcate, obtuse side lobes, midlobe suborbicular; disk with 3 crenulate ridges.....5. *odoratissima*.

Pseudobulbs over 1 in. long; flowers 1 in. or more long:—

Midlobe of lip triangular-lanceolate, acute, keels 3—5, crenulate. Pseudobulbs crowded, ovoid, corrugated; leaves 2, lanceolate to broadly elliptic-oblong, acute, 1.5—5 in. long, .5—1.4 in. wide; petiole channelled; bracts persistent, broadly lanceolate up to 1.3 in. long; sepals elliptic-lanceolate, acute.....6. *nervosa*.

Midlobe of lip ovate-oblong or suborbicular, rounded, keels 3, entire, sometimes glandular towards the apex. Pseudobulbs crowded or distant, ovoid,

curved, not corrugate; leaves 2, oblong to lanceolate, acute or subacute, 3·5—12 in. long, 1—2 in. wide; petiole stout, channelled; bracts persistent, ovate-lanceolate, up to 1·5 in. long; sepals elliptic-oblong, rounded

7. *glandulosa*.

1. *COELOGYNE UNIFLORA*, Lindl.; F. B. I. v. 842; King & Pantl. Ann. Calc. viii. t. 192.

Nilgiri Hills (Proudlock).

Flowers pale ochraceous.

2. *COELOGYNE BREVISCAPA*, Lindl.; F. B. I. v. 833 (*in part*).

Mysore (Meebold), Nilgiri Hills (Wight, G. Thomson).

Flowers white.

3. *COELOGYNE MOSSIAE*, Rolfe.

Nilgiri and Pulney (Fyson, Anglade) Hills; 7,000—8,000 ft.

Flowers white.

4. *COELOGYNE ANGUSTIFOLIA*, Wt. Ic. t. 1641. *C. breviscapa*, Hook. f. (*not Lindl.*) F. B. I. v. 833 (*in part*).

Nilgiri Hills (Wight, Bourne).

Flowers white, tinged with yellow.

5. *COELOGYNE ODORATISSIMA*, Lindl.; F. B. I. v. 834; Wt. Ic. t. 1640.

Nilgiri Hills, 7,000—8,000 ft.

Often aggregated in very large patches; flowers white, tinged with yellow.

Var. *angustifolia*, Lindl. Pseudobulbs and leaves more slender; midlobe of lip elliptic, long acuminate. Nilgiri Hills.

6. *COELOGYNE NERVOSA*, A. Rich. *C. corrugata*, Wt. Ic. t. 1639; F. B. I. v. 835.

W. Ghâts from Mysore to Tinnevely, 3,000—7,000 ft.

Flowers white, lip yellowish.

7. *COELOGYNE GLANDULOSA*, Lindl.; F. B. I. v. 835. *C. nervosa*, Wt. Ic. t. 1638.

W. Ghâts.

Flowers white, lip white and yellowish-brown.

17. *Pholidota*, Lindl.

Epiphytic herbs; stem of single, often aggregated pseudobulbs or jointed and sometimes branching. *Leaves* in pairs or solitary. *Scape* terminal or from the base of the pseudobulb, usually drooping, often flexuous; bracts distichous, rigid. *Flowers* small, globose or subglobose. *Sepals* concave. *Petals* flat, broad or narrow. *Lip* sessile on the base of the column, erect, saccate, subentire or lobed. *Column* very short, apex hooded or winged; foot 0. *Anther* 2-celled, more or less globose; pollinia 4, waxy, subglobose or clavate, free or cohering in pairs by a viscus or membrane.

PHOLIDOTA IMBRICATA, Lindl.; F. B. I. v. 845; Wt. Ic. t. 907; King & Pantl. Ann. Calc. viii. t. 201.

E. and W. Ghâts, 2,000—3,500 ft.

A pendent herb; pseudobulbs aggregated, narrowly ovate-cylindric, 1—2·5 in. long; leaf solitary, elliptic-lanceolate or oblanceolate, 4—14 in. long, 8—2·1 in. wide, acute, tapering into a short, stout petiole, 3-ribbed; scape arising from the top of

the pseudobulb; raceme drooping, with the scape up to 26 in. long; bracts persistent, convolute, subrotund, acute, pale-brown, striate, .33 in. long; flowers numerous, close-set, .25 in. long, white with a pinkish or yellowish-brown tinge; lateral sepals with a winged keel, dorsal orbicular, 3-nerved, petals linear-oblong, subacute, lip subequally 3-lobed, midlobe 2-lobulate with a broad sinus between.

18. *Calanthe*, Br.

Terrestrial herbs, often pseudobulbous with a short or tall, leafy stem. *Leaves* plaited. *Scape* axillary, terminal or lateral from a leafy pseudobulb. *Flowers* medium-sized, racemed. *Sepals* subequal, spreading, rarely connivent. *Petals* broad or narrow. *Lip* adnate to the top or base of the column, 3-lobed, midlobe often 2-fid, disk lamellate or tubercled, with or without a spur. *Column* long or short, obliquely truncate; foot 0. *Anther* conical or convex, 2-celled; pollinia 8, waxy, cohering in pairs by a granular viscus.

Stem short, stout; leaves elliptic-ovate to lanceolate, acuminate, 10—20 in. long, 3—6 in. wide, sessile, or base tapering into a usually short petiole, usually sparsely pubescent, at least below, sometimes glabrescent; scape lateral, stout, with the lax-flowered raceme up to 3 ft. long, sparsely puberulous; bracts large, ovate-lanceolate, herbaceous, puberulous; flowers puberulous, .75—1 in. long; lip hardly exceeding the sepals, side lobes short, falcate-oblong, mid-lobe much larger, broadly or cuneately reniform, spur linear-subspathulate, longer than the sepals

1. *Masuca*.

Stem short; leaves elliptic-ovate to lanceolate, acuminate, 8—14 in. long, 3—5 in. wide, quite glabrous, tapering into a usually long petiole; scape stout, with the dense-flowered raceme up to 2 ft. long, sparsely puberulous; bracts large, ovate-lanceolate, puberulous; flowers puberulous, .5—8 in. long; lip longer than the sepals, side lobes large, oblong, obtuse, midlobe more or less deeply cleft into 2 oblong segments with an acute sinus, spur linear, slender, longer than the lip

2. *veratrifolia*.

1. *CALANTHE MASUCA*, Lindl.; F. B. I. v. 850; King and Pantl. Ann. Calc. viii. t. 234.

W. Ghâts, 3,000—6,000 ft.

Flowers usually pale- or dark-purple, sometimes pale-rose or white with a purple lip; lip always bright coloured.

2. *CALANTHE VERATRIFOLIA*, Br.; F. B. I. v. 851. *C. Perrottetii*, A. Rich.; Wt. Ic. t. 1664—5.

W. Ghâts, 6,000—8,000 ft.

Flowers white or pale-like. Very like *C. Masuca*, but smaller and more slender.

19. *Arundina*, Blume.

Terrestrial erect plants; stem simple, rigid, terete, sheathed. *Leaves* distichous, narrow and grass-like. *Flowers* large in terminal, erect, stiff, simple or branched racemes or panicles. *Sepals* free, spreading, lanceolate, acuminate, flat, many-nerved. *Petals* broader, many-nerved. *Lip* large, broad, sessile on the base of the column and embracing it. *Column* long, slender, narrowly winged; foot 0. *Anther* 4-celled; pollinia 8, in 2 superposed rows attached by fours to one membrane.

ARUNDINA GRAMINIFOLIA, Hochr. *A. bambusifolia*, Lindl.; F. B. I. v. 857; Wt. Ic. t. 1661; King. & Pantl. Ann. Calc. viii. t. 156.

W. Gháts, 3,000—6,000 ft.

A stout, almost woody, reed-like plant reaching 5—6 ft. in height and 1 in. in diameter; leaves linear to linear-lanceolate, acute or acuminate, 5—10 in. long, $\frac{3}{4}$ —1 in. wide; flowers about 1.5 in. long, pinkish-purple; sepals lanceolate, petals shorter, rhomboid-elliptic, lip 3-lobed, mid-lobe more or less deeply bifid, crisped, with 3—5 lamellate nerves.

20. *Eulophia*, R. Br.

Quite glabrous terrestrial herbs; rhizome tuberous, rarely pseudobulbous. *Leaves* appearing with or after the flowers, usually plicate. *Scape* lateral, erect, sheathed. *Flowers* racemose, rarely panicle. *Sepals* and *petals* free, spreading, usually subequal. *Lip* adnate to the foot of the column, base saccate or spurred or forming a short mentum, lateral lobes erect, embracing the column, rarely 0, mid-lobe spreading or recurved, disk ridged or crested. *Column* short or long, top oblique, entire, rarely lobed, sometimes with winged or lobed margins; foot present or absent. *Anther* terminal, 2-celled; pollinia 2 or 4, sessile or attached by a short strap to a discoid gland.

Column not produced into a foot:—

Pseudobulbs large, emerging above ground:—

Leaves very narrow, grass-like, 1-ribbed; scapes often branched:—

Leaves 6—30 in. long, $\frac{1}{2}$ — $\frac{3}{4}$ in. wide, midrib stout; scape 1—3 ft. or more long; flowers $\frac{1}{2}$ — $\frac{3}{4}$ in. long; sepals linear-oblong, subacute or obtuse, petals elliptic, obtuse, lip obovate-oblong, as long as the sepals, side lobes small, disk with 5-crested nerves, spur short.....1. *epidendraea*.

Leaves 3—6 in. long, $\frac{1}{2}$ — $\frac{3}{4}$ in. wide, midrib not very stout; scape 1—2 ft. long; flowers $\frac{1}{2}$ — $\frac{3}{4}$ in. long; sepals lanceolate acuminate or elliptic-lanceolate acute, petals slightly broader, lip obovate-oblong, side lobes small, disk with 3—5 lamellate or crested nerves, fimbriate on the rounded lobe, spur short.....2. *graminea*.

Leaves elliptic-lanceolate, acuminate, 3-ribbed, 6—10 in. long, $\frac{1}{2}$ — $\frac{3}{4}$ in. wide. Pseudobulbs fusiform, 2—6 in. long; scape stout, unbranched, with the raceme 2—3 ft. long; bracts linear-lanceolate; flowers $\frac{1}{2}$ — $\frac{3}{4}$ in. long; sepals lanceolate acute, petals broader, lip broader than long, side lobes short, obtuse, midlobe revolute, rounded, disk 2-lamellate at the base, spur a rounded 2-lobed sac.....3. *macrostachya*.

Roots tuberous, underground; leaves elliptic-lanceolate; scape unbranched:—

Lip longer than broad, its nerves fringed:—

Stem 3—6 in. long, sheathed; leaves 4—12 in. long, $\frac{1}{2}$ — $\frac{3}{4}$ in. wide; scape 8—15 in. long, with loose ochreate sheaths below; bracts conspicuous, linear acuminate, $\frac{1}{2}$ — $\frac{3}{4}$ in. long, flowers about $\frac{1}{2}$ in. long; sepals linear-lanceolate, acute, petals broadly elliptic, lip broadly ovate, obtuse, side lobes 0.....4. *ochreatea*.

Stem 4—6 in. long, sheathed; leaves 6—12 in. long, $\frac{1}{2}$ — $\frac{3}{4}$ in. wide; scape 1—3 ft. long, with large acuminate sheaths below; bracts up to 1.75 in. long; flowers $\frac{1}{2}$ — $\frac{3}{4}$ in. long; sepals linear-lanceolate, petals oblong-elliptic, shorter, obtuse or acute, lip obovate-oblong, side lobes small, rounded, midlobe oblong or obovate-oblong.....5. *herbacea*.

Lip broader than long; leaves 4—12 in. long, $\frac{1}{2}$ — $\frac{3}{4}$ in. wide; scape 1—3 ft. long; bracts ovate-lanceolate, acuminate; flowers $\frac{1}{2}$ — $\frac{3}{4}$ in. long; sepals and petals elliptic oblong, obtuse, side lobes of lip large, oblong, rounded, midlobe broadly subovate, or suborbicular, disk with 3 crested nerves.....6. *pratensis*.

Column produced into a foot:—

Root tuberous; leaves elliptic-lanceolate, acute, 10—15 in. long; scape 1—3 ft. long; bracts lanceolate, acute; flowers 9—1 in. long; sepals linear-oblong, acute, dorsal slightly narrower, petals oblong, obtuse, shorter and wider than the sepals, lip obovate-oblong, side lobes short, rounded, midlobe obovate-oblong, obtuse or retuse, crisped, disk with many crenulate or tubercled nerves...7. *nuda*. Root tuberous; leaves oblong-lanceolate, acute; scape rather slender, angular, sheathed, with the raceme 1—2 ft. long; bracts ovate-ensiform; flowers about 1 in. long; sepals acute, dorsal narrowly oblanceolate, lateral falcate-lanceolate, petals wider, oblong, obtuse, mentum conical, subacute, lip with the mentum as long as the petals, as broad as long, side lobes large, triangular-falcate, obtuse or subacute, midlobe tongue-shaped, half as long as the whole lip, slightly concave, rounded, disk with 3 tubercled crests.....8. *Cullenii*.

1. *EULOPHIA EPIDENDRAEA*, Fischer, n. comb. *E. virens*, R. Br.; F. B. I. vi. 1; Wt. Ic. t. 913. *Limodorum virens*, Sw.; Cor. Pl. i. t. 38.

In all districts from sea-level to 3,000 ft.

Flowers green, lip white, nerves and crests red.

2. *EULOPHIA GRAMINEA*, Lindl.; F. B. I. vi. 2; King & Pantl. Ann. Calc. viii. t. 238

Travancore (Wight, Bourdillon), Chingleput (Gamble), Cud-dapah Hills (Fischer), sea-level to 2,500 ft.

Very similar to the last in habit and coloration, but smaller in all respects.

3. *EULOPHIA MACROSTACHYA*, Lindl.; F. B. I. vi. 4; Wt. Ic. t. 1667—8. Nilgiris and Courtallam (Wight).

Flowers green, lip yellow with red stripes, spur green.

4. *EULOPHIA OCHREATA*, Lindl.; F. B. I. vi. 2.

Vizagapatam Hills at 3,300 ft. (A. W. Lushington).

5. *EULOPHIA HERBACEA*, Lindl.; F. B. I. vi. 2; Duthie Ann. Calc. ix. t. 106.

Bababudan Hills of Mysore (Law).

Flowers white with purple nerves.

6. *EULOPHIA PRATENSIS*, Lindl.; F. B. I. vi. 4. *E. ramentacea*, Wt. Ic. t. 1666.

W. Gháts.

Flowers yellow.

7. *EULOPHIA NUDA*, Lindl.; F. B. I. vi. 5; Hook. f. Ann. Calc. v. t. 47; King & Pantl. Ann. Calc. viii. t. 243. *Cyrtopera fusca*, Wt. Ic. t. 1690.

W. Gháts, 2,000—7,000 ft.; Vizagapatam Hills at 3,800 ft. (A. W. Lushington.)

Flowers greenish-purple, yellow and white.

8. *EULOPHIA CULLENII*, Fischer n. comb. *Cyrtopera Cullenii*, Wt. Ic. t. 1754; F. B. I. vi. 7 (under *E. flava*, Hook. f.).

Travancore (Cullen), Anamalai and Pulney (Bourne, Saulière and Anglade) Hills, 3,500—7,000 ft.

Flowers yellow (Wight) or purple (Anglade).

Var. *minor* with flowers 6 in. long. Pulney Hills at 6,000 ft. (Van Malderen).

21. *Cymbidium*, Swartz.

Epiphytic, rarely terrestrial herbs; stem short, rarely elongate and pseudobulbous; roots tufted. *Leaves* long, rarely short, narrow, coriaceous. *Scape* from the side of the stem, sheathed. *Flowers* often large, in erect or drooping, few- or many-flowered racemes. *Sepals* and *petals* subequal, free, erect or spreading. *Lip* sessile at the base of the column and embracing it with the erect side lobes, midlobe recurved, disk with 2 median ridges. *Column* long; foot 0. *Anther* 1- or imperfectly 2-celled; pollinia 2 deeply grooved or 4, sessile on a small or large, often strap-shaped gland.

Leaves linear-oblong, subacute, not notched, 24—30 in. long, .75—1 in. wide; *scape* and *raceme* 10—20 in. long, decurved from the base; *flowers* 1.25 in. across, *ovary* .5 in. long; *lip* as long as the *sepals*, side lobes narrow, midlobe oblong, obtuse, emarginate, much decurved, disk with 2 parallel continuous lamellae with clavate apices.....1. *pendulum*.

Leaves linear-oblong, obtuse, shortly obliquely notched, 12—22 in. long, .75—1.5 in. wide; *scape* and *raceme* 8—20 in. long, erect below, decurved above; *flowers* 1.5 in. across, *ovary* nearly 1 in. long; *lip* as long as the *sepals*, side lobes narrow, midlobe ovate-oblongate, much decurved, disk with 2 lamellae, broken and discontinuous near the middle.....2. *aloifolium*.

1. *CYMBIDIUM PENDULUM*, Sw.; King & Pantl. Ann. Calc. viii. t. 251. *C. aloifolium*, Hook. f.; F. B. I. vi. 10 (in part). *Epidendrum pendulum*, Roxb. Cor. Pl. t. 44.

Hills of the Circars (Roxborough).

An epiphytic herb; flowers dark purple-brown, sepals and petals with yellow margins.

2. *CYMBIDIUM ALOIFOLIUM*, Sw.; F. B. I. vi. 10 (in part); Wt. Ic. t. 1687—8; King & Pantl. Ann. Calc. viii. t. 252. *C. bicolor*, Hook. f. F. B. I. vi. 11. *C. erectum*, Wt. Ic. t. 1753.

In all hilly tracts, 100—3,500 ft.

An epiphytic herb; flowers yellowish-red, or brownish-red.

22. *Geodorum*, Jackson.

Terrestrial herbs; rootstock tuberous. *Leaves* elliptic, acute, plicate. *Scape* from the rootstock, stout, erect, sheathed. *Flowers* crowded in decurved racemes; bracts narrow, membranous. *Sepals* and broader *petals* subequal in length, conniving or spreading. *Lip* sessile on the base or short foot of the column, entire, cymbiform, membranous, margins involute, disk with a basal forked callus and with or without ridges ending in calli. *Column* short, stout. *Anther* 2-celled, appendaged after dehiscence; pollinia 2, broad, sessile or subsessile on a broad strap or gland.

- GEODORUM DENSIFLORUM*, Schlechter. *G. purpureum*, R. Br.; F. B. I. vi. 16. *G. dilatatum*, R. Br.; F. B. I. vi. 17; Wt. Ic. t. 912. *Limodorum recurvum*, Roxb. Cor. Pl. t. 39.

In all districts, 200—3,000 ft.

A stout herb; leaves petioled, 4—10 in. long, 2—5 in. wide; scape with raceme up to 2 ft. long; flowers 4 in. long, pale-purple or rose, the lip with darker markings; sepals linear-oblong, acute, lip ventricose at the base, subpandurate, apex rounded,

emarginate or 2-fid, disk with a channelled ridge ending in raised calli or granulate.

23. *Polystachya*, Hooker.

Epiphytic herbs; caulescent or pseudobulbous. *Leaves* few, distichous. *Scape* terminal, sheathed. *Flowers* small, racemose or paniced. *Sepals* free, lateral triangular or triangular-ovate, adnate to the foot of the column. *Petals* much smaller, very narrow. *Lip* superior, clawed and jointed on the foot of the column, erect, 3-lobed, side lobes erect. *Column* short, broad; foot rather long. *Anther* 1- or sub 2-celled; pollinia 4, cohering or connate in pairs, attached to a very short strap or gland.

Pseudobulbs small; leaves 3—4, narrow-lanceolate, acute, 2—7 in. long, 3—1 in. wide; scape compressed; rhachis angular, glabrous or sparingly brown-pubescent; flowers 1 in. long; lateral sepals ovate-triangular, apiculate, lip suborbicular, side lobes obtuse, nearly as large as the semi-circular midlobe.....1. *Wightii*. Pseudobulbs small; leaves 3—4, narrowly oblong or lanceolate, obtuse or subacute, 2—7 in. long, 5—1.1 in. wide; scape compressed; rhachis angular, glabrous or sparingly brown pubescent; flowers 1 in. long, lateral sepals broadly triangular-lanceolate from a broad base, acute or apiculate, lip broadly oblong, side lobes small, obtuse, midlobe much larger, tongue-shaped or broadly ovate-oblong, apex rounded or emarginate.....2. *purpurea*.

1. *POLYSTACHYA WIGHTII*, Reichb. f.; F. B. I. vi. 21. *P. luteola*, Wt. Ic. t. 1678.

W. Gháts, 2,000—4,500 ft. Not common.

Flowers yellow.

2. *POLYSTACHYA PURPUREA*, Wt. Ic. t. 1679; F. B. I. vi. 21.

W. Gháts, 3,000—4,000 ft. Not common.

Flowers purple or deep lilac.

24. *Luisia*, Gaud.

Tufted epiphytic herbs; stems terete, rigid, sheathed, usually erect. *Leaves* fleshy, elongate, terete, obtuse. *Flowers* small, spicate on a short, stout extra-axillary rhachis; bracts short, thick, imbricating, persistent. *Sepals* subequal or the decurved dorsal smaller. *Petals* equal to or longer than the lateral sepals, spreading. *Lip* sessile on the base of the column, basal portion flat or saccate, apical decurved, broad, ridged. *Column* very short, truncate. *Anther* 2-celled; pollinia 2, ovoid or subglobose; caudicle strap-like.

Stem 6—12 in. long, slender or rather thick; leaves spreading, green, spotted with purple, 3.5—7 in. long, .06—13 in. thick; flowers 2—3 in. long; sepals and petals subequal, narrow, lip longer, quadrate and subsaccate at the base, the apical portion rhomboid-ovate, apex entire.....1. *teretifolia*.

Stem 12 in. or more long, slender; leaves spreading, green, 3—7 in. long, sometimes very slender; flowers .5 in. long; petals much longer than the sepals, narrow, lip about as long as the petals, narrowly pandurate, convex, base broad, flat, 2-auricled, apex with 2 divergent lobules.....2. *tenuifolia*.

1. *LUISIA TERETIFOLIA*, Gaud.; F. B. I. vi. 22; King & Pantl. Ann. Calc. viii. t. 271. *Cymbidium tenuifolium*, Wt. Ic. t. 1689.

W. Gháts, 3,000—4,000 ft.; Vizagapatam Hills at 4,000 ft. (A. W. Lushington).

Flowers greenish-yellow or pale-pink, lip purple.

2. *LUISIA TENUIFOLIA*, Bl.; F. B. I. vi. 24. *Cymbidium triste*, Wt. Ic. t. 911.

W. Ghâts, Melpat in South Arcot (Barber), near sea-level to 4,000 ft.

Flowers yellowish with a purple tinge, lip dark purple with a white patch on either side, and pale purple lobes.

25. *Cottonia*, Wight.

Epiphytic herbs; stems leafy, emitting vermiform roots. *Leaves* coriaceous, narrow. *Flowers* in lateral short racemes; peduncles long, simple or branched. *Sepals* subequal, spreading. *Petals* narrower, spreading or reflexed. *Lip* sessile, not jointed, at the base of the column, flat, much longer than the sepals, subpandurate, 2-auricled at the base, side lobes indistinct, mid-lobe rounded, retuse. *Column* short; foot 0. *Anther* short, hemispheric, 2-celled; pollinia 2, pyriform, 2-cleft or 4 with the 2 smaller incumbent on the 2 larger; caudicle long, narrow; gland very small.

COTTONIA MACROSTACHYA, Wt. Ic. t. 1755; F. B. I. vi. 26.

Malabar near Tellicherry (Jerdon); Anamalais Hills at 2,600 ft. (Fischer); Travancore (Johnson, Calder and Ramaswami).

Stem stout, 4—8 in. long; internodes short; leaves strap-shaped, apex more or less unequally 2-lobed, 4—8 in. long, 3—8 in. wide, keeled below; scape slender, erect, up to 30 in. long, bracts minute; flowers somewhat like a humble-bee; sepals ovate-oblong, obtuse, about 25 in. long, petals oblanceolate, all greenish-yellow or orange veined with red, lip purple with a broad golden-villous margin; base with 3 calli, disk with a median pubescent callus.

26. *Kingiella*, Rolfe.

Epiphytic herbs; stems short, leafy. *Leaves* coriaceous, flat. *Scapes* lateral or axillary, simple or branched. *Sepals* and *petals* subequal or unequal, spreading. *Lip* with a saccate or spur-like mentum, 3-lobed, sessile on the foot of the column, side lobes usually with an awned plate, midlobe with a 2-awned plate. *Column* rather long, narrowly winged; foot usually long. *Anther* 2-celled; pollinia 2, sulcate or 2-partite; strap linear or spatulate; gland large or small.

KINGIELLA DECUMBENS, Rolfe. *Doritis Wightii*, Benth.; F. B. I. vi. 32; Hook. f. Ann. Calc. v. t. 59; King & Pantl. Ann. Calc. viii. t. 265.

Circars (Heyne); Quilon (Wight).

A pendulous herb; stem stout, hardly 1 in. long; leaves 1—4, oblong, usually slightly oblanceolate, obtuse; margins subundulate, 3—8 in. long, 9—2 in. wide; scape from the stem below the leaves, up to 16 in. long, slender; flowers small, pale-ochraceous marked with purple; sepals and petals subequal in length, obtuse, the petals broader, lip with a saccate mentum, side lobes large, oblong, obtuse, with a broad plate near the anterior margin, midlobe obovate, emarginate, with a ligulate, forked, 2-awned plate near the base.

27. *Rhynchosstylis*, Blume.

Epiphytic herbs; stem stout, often woody, leafy. *Leaves* very thick, linear or oblong, apex 2-lobed. *Flowers* in erect or pendulous, many-flowered, cylindric, simple or branched racemes. *Sepals* broad, obtuse, spreading. *Petals* similar, smaller. *Lip* adnate to the foot of the column, spur forming a sac, often pubescent within, side lobes 0, epichyle dilated, erect or recurved on the outer rim of the spur. *Column* short, stout; foot short or 0. *Anther* rounded; pollinia 2; caudicle long, slender; gland oblong, small.

Stem 3—8 in. long, woody; leaves linear, deeply channelled, 6—20 in. long, .5—2 in. wide, apex subequally acutely 2-lobed or lobes very unequal, one rounded or acute, the other truncate; racemes simple, as long as the leaves; flowers .6 in. long; spur saccate, laterally flattened, parallel to the pedicel, epichyle flat, widened and cuneate or emarginate at the apex.....1. *retusa*. Stem short; leaves oblong, flat, slightly keeled, 1.5—3 in. long, .6—1 in. wide; apex subequally bluntly 2-lobed; racemes simple or branched, 3—6 in. long; flowers .12 in. long; spur pouch-like, at right angles to the pedicel, epichyle narrow, channelled above and thickened into a vertical cone at the apex.....2. *latifolia*.

1. *RHYNCHOSTYLIS RETUSA*, Bl.; F. B. I. vi. 32; King & Pantl. Ann. Calc. viii. t. 284. *Saccolabium guttatum*, Wt. Ic. t. 1745—6.
Circars (Heyne, A. W. Lushington); Walaiyar (Wight); Malabar Coast (Barber).
Flowers pale pink spotted with darker pink, lip dark pink.
2. *RHYNCHOSTYLIS LATIFOLIA*, Fischer in Kew Bull. 1927. 358.
Mysore at Cardamonai (Barber).

28. *Chilochista*, Lindl.

Epiphytic herbs; stem very short, leafless, scaly; roots slender, long. *Racemes* erect. *Sepals* and *petals* similar, broad, spreading, the lateral sepals inserted on the apical portion of the foot; petals usually running down the foot. *Lip* movable on the foot, 3-lobed, spur saccate, side-lobes erect, midlobe very short, disk with a pubescent callus. *Column* short; foot broad. *Anther* 2-celled; pollinia 2, globose, deeply furrowed; caudicle short.

CHILOCHISTA PUSILLA, Schlechter. *C. usneoides*, Wt. Ic. t. 1741.
Sarcochilus Wightii, Hook. f.; F. B. I. vi. 37.

Cochin (Johnson); Nilgiris (Jerdon).

A small herb; roots green; scape and raceme 1.5—3 in. long; flowers about .2 in. long, white or creamy; ovary puberulous, spur short, broadly conical.

29. *Aerides*, Lour.

Epiphytic herbs; stem leafy, often woody. *Leaves* coriaceous, flat and channelled or terete. *Flowers* generally numerous, showy; in dense or lax spikes, racemes or panicles. *Sepals* and *petals* similar, lateral sepals and sometimes the petals adnate to the foot of the column. *Lip* more or less elastically inserted at the end of the foot, spurred, side lobes small or large, rarely 0, midlobe usually larger than the side lobes or smaller and incurved between them, spur usually curved forward and with calli within. *Column* short; foot usually

long. *Anther* 2-celled, beaked or not; *pollinia* 2, globose, sulcate; *caudicles* long or short.

Leaves terete, acute, 2—6 in. long, .1—2 in. diam. Stems rather slender, elongate; flowers few on a short, stout peduncle, .75 in. long; sepals obovate-oblong, obtuse, petals shorter and broader, side lobes of lip erect, about as long as the shortly cuneiform, fleshy, ridged midlobe, spur narrow, straight or slightly recurved

1. *cylindricum*.

Leaves flat, keeled:—

Side lobes of lip much narrower than the midlobe:—

Lip more than .5 in. long, horizontal or inflexed:—

Stems 1—3 in. long, very stout; leaves linear-oblong, channelled, apex unequally bluntly 2-lobed, 3—10 in. long, .5—1.2 in. wide; flowers in usually paniced racemes longer than the leaves; bracts minute; sepals obovate, .4 in. long, petals as long, narrower, lip quadrate-oblong, .6—8 in. long, side lobes small, rounded, midlobe refuse, spur rather large, strongly incurved

2. *maculosum*.

Stems 2—10 in. long, stout; leaves oblong or linear-oblong, apex unequally bluntly 2-lobed, 2.5—8 in. long, .6—1.75 in. wide; flowers usually in simple (sometimes branched) racemes longer than the leaves; bracts small; sepals oblong, obtuse, petals broader, lip nearly 1 in. long, geniculately incurved at the claw, side lobes oblique, small, midlobe over .5 in. long, ovate, sub-obtuse, somewhat 3-lobed, margin crenulate, with 2 fleshy calli at the base closing the mouth of the spur, spur strongly incurved, the apex often concealed beneath the reflexed edges of the lip.....3. *crispum*.

Lip about .3 in. long, deflexed. Stem 1—7 in. long, stout; leaves linear to linear-oblong, apex unequally bluntly 2-lobed, 2.5—10 in. long, .25—1 in. wide; flowers in simple or branched racemes, shorter or longer than the leaves; bracts minute; sepals suborbicular, petals narrower, side lobes of lip small, midlobe ovate, disk with 2 large basal calli, spur cylindric, obtuse, incurved

4. *ringens*.

Side lobes of the lip broad, midlobe narrowly lanceolate, acute, erose, incurved between the side lobes. Stem 3—12 in. long, stout; leaves linear-oblong or oblong-lanceolate, apex unequally bluntly 2-lobed, 5—10 in. long, .7—1.5 in. wide; flowers in usually simple racemes, as long as or longer than the leaves; bracts rather large; lateral sepals suborbicular, longer and wider than the dorsal sepal and the petals, lip about .5 in. long, longer than the lateral sepals, spur subacute, strongly incurved.....5. *odoratum*.

1. *AERIDES CYLINDRICUM*, Lindl.; F. B. I. vi. 44; Wt. Ic. t. 1744.

W. Gháts.

Flowers white or tinged with red, lip reddish, midlobe yellowish at the base (Wight).

2. *AERIDES MACULOSUM*, Lindl.; F. B. I. vi. 45. *Saccolabium speciosum*, Wt. Ic. tt. 1674—5.

W. Gháts, Ramandrug at 3,500 ft. (Gamble).

Flowers rose-coloured, lip darker.

3. *AERIDES CRISPUM*, Lindl.; F. B. I. vi. 45. *A. Lindleyanum*, Wt. Ic. tt. 1677.

Nilgiri and Pulney Hills, 3,000—6,000 ft.

Flowers sweet-smelling; pinkish white shaded with darker pink.

4. *AERIDES RINGENS*, Fischer n. comb. *A. radicosum*, A. Rich.; F. B. I. vi. 46. *A. lineare*, Hook. f.; F. B. I. vi. 47. *Saccolabium Wightianum*, Lindl.; Wt. Ic. t. 917. *S. rubrum*, Wt. Ic. t. 1673. *S. paniculatum*, Wt. Ic. t. 1676.

W. Gháts, 800—8,000 ft.

Often growing on rocks as well as epiphytic. Flowers from nearly white to deep rose-pink; leaves often mottled with purple.

5. *AERIDES ODORATUM*, Lour.: F. B. I. vi. 47; King & Pantl. Ann. Calc. viii. t. 282.

Circars (Heyne); Vizagapatam (Barber); Rampa Hills at 2,000 ft. (Narayanswami).

Flowers very fragrant; white spotted with pink.

30. *Vanda*, R. Br.

Epiphytic herbs or shrubs; stems often very long and scandent, leafy. *Leaves* very coriaceous or fleshy, flat, keeled or terete. *Flowers* in simple lax or dense racemes, usually showy and rather large. *Sepals* and *petals* subequal, spreading or incurved, narrowed to the base. *Lip* usually saccate or spurred, side lobes large or small, rarely 0, adnate to the foot of the column or to the sides of the sac or spur, midlobe fleshy, disk usually ridged or lamellate. *Column* short, stout; foot very short or 0. *Anther* 2-celled; rostellum small; pollinia 2, didymous, subglobose or obovoid; caudicle short or long and geniculate; gland usually large.

Leaves terete, slender, 3·5–8 in. long. Stem slender up to 8 ft. long; peduncles axillary, suberect, long; raceme 2–6-flowered; flowers 2·5–4 in. in diam.; sepals broadly oblong or obovate, blunt, lateral often with a short spur outside, below the apex, petals larger, subrotund, lip longer than the lateral sepals and with them adnate to the very short foot, side lobes large, elliptic, midlobe clawed, obovate, more or less deeply bifid, spur funnel-shaped.....1. *teres*.

Leaves flat or keeled, not terete:—

Leaves less than 10 in. long:—

Flowers less than 1 in. in diam. Stems stout, 3–6 in. long; leaves conduplicate, keeled, linear, apex unequally obtusely (rarely acutely) 2-lobed, 3–6 in. long, 4–7 in. wide; scapes few-flowered, axillary from the existing or fallen leaves, as long as or often longer than the leaves; bracts small; sepals broadly obovate, spreading, petals spathulate-oblong, lip adnate to the foot of the column, spur narrowly funnel-shaped, slightly curved at the lip, side lobes erect from the edges of the spur, midlobe obovoid, tip dilated, crenulate, truncate or retuse, disk 2-ridged; capsules 1–1·5 in. long.....2. *parviflora*.

Flowers more than 1 in. in diam.; capsules more than 1·5 in. long:—

Stem 2–4 ft. long, scandent; leaves flat or not strongly conduplicate, ovate or linear-oblong obtuse or subacute apex oblique and entire or emarginate, 2–4 in. long, 5–1·25 in. wide; scape leaf-opposed, robust, with the few to many-flowered raceme up to 20 in. long, erect; bracts persistent, ovate-cordate, acute, 3–4 in. long; flowers 1·25 in. in diam.; sepals and petals flat, spathulately oblong, obtuse, lip clawed, as long as the sepals, side lobes small, oblong, midlobe triangular-obovate, obtuse, somewhat 3-lobed, decurrent on the short, conical, acute spur; capsules 1·5–2 in. long.....3. *spathulata*.

Stem 1–2 ft. long, scandent; leaves conduplicate, keeled, linear-oblong, apex praemorse, 3-toothed, all teeth acute or 2-rounded, 3–8 in. long, 5–1·2 in. wide; scapes axillary, stout, with the raceme up to 10 in. long, 6–10-flowered; bracts suborbicular, 0·12 in. long; flowers 1·5–2 in. in diam.; sepals obovate, spreading, petals shorter, side lobes of lip erect, ovate, acute, midlobe twice as long, pandurate, dilated at the apex, lip 2-lobed, disk with fleshy ridges, spur straight, conical, obtuse; capsules 3–4 in. long

4. *tessellata*.

Leaves narrowly ligulate, unequally, acutely 2-lobed, more than 1 ft. long; scapes few-flowered; side lobes of lip subquadrate, midlobe broadly ovate, obtusely 2-lobed, disk with 2 thick ridges, pilose at the base of the ridges and side lobes, spur conical, column slender for the genus.....5. *Wightii*.

1. *VANDA TERES*, Lindl.; F. B. I. vi. 49; King & Pantl. Ann. Calc. t. 285.

Vizagapatam Hills at 3,300 ft. (A. W. Lushington).

Flowers white or rose, lip yellow or reddish-brown, spotted and lined with red and purplish-brown.

2. *VANDA PARVIFLORA*, Lindl. ; F. B. I. vi. 50 ; Wt. Ic. t. 1669 ; King & Pantl. Ann. Calc. viii. t. 286.

In all Districts in hilly tracts, 1,000—4,000 ft.

Flowers yellow, midlobe of lip lilac or whitish with lilac lines.

3. *VANDA SPATHULATA*, Spreng. ; F. B. I. vi. 50 ; Wt. Ic. t. 915.

In most districts, about sea-level (Sriharikota in Nellore [Fischer]) to 3,000 ft. ; usually in rather dry tracts.

Often starting terrestrially, and later attaching itself to shrubs and becoming entirely epiphytic. Leaves and scapes often marked with blood-red spots ; flowers golden-yellow.

4. *VANDA TESSELLATA*, Hook. *V. Roxburghii*, R. Br. ; F. B. I. vi. 52 ; Wt. Ic. t. 916 ; Duthie Ann. Calc. ix. t. 116. *Epidendrum tessellatum*, Roxb. Cor. Pl. t. 42.

In all districts, about sea-level to 2,000 ft.

Sepals and petals tessellated yellow with brown lines and white margins, lip bluish dotted with purple. Vern. *Tel.* Saga.

5. *VANDA WIGHTII*, Reichb. f. ; F. B. I. vi. 54.

Nilgiri Hills (Wight).

A little-known species.

31. *Saccolabium*, Blume.

Epiphytic herbs ; stems leafy. *Leaves* long, linear, sometimes terete. *Flowers* solitary or in simple or branched, few to many-flowered racemes, small or moderate-sized. *Sepals* and *petals* free, spreading, recurved or incurved. *Lip* spurred, 3-lobed, rarely entire, side lobes short, erect, midlobe fleshy, spur saccate, naked within, or with calli on the front wall only. *Column* short and broad ; foot 0 or indistinct. *Anther* 1- or imperfectly 2-celled ; pollinia 2, entire or 2-partite.

Leaves very slender, terete, 2—8 in. long. *Stem* slender, 3—18 in. long ; racemes lateral, up to 3 in. long ; bracts lanceolate, minute ; sepals linear, petals orbicular, all shorter than the cylindric, obtuse spur, limb of lip ovate, acute, deflexed, side lobes erect, rounded.....1. *filiforme*.
Leaves flat:—

Spur of lip 2—3 times longer than the sepals. *Stem* 2—8 in. long ; leaves linear-lanceolate, acuminate, narrowed at the base, 2—4 in. long, .3 in. wide, straight or falcate ; racemes slender, simple, 3—6 in. long ; bracts minute ; flowers .2 in. long ; sepals oblong obtuse, dorsal concave, petals slightly smaller, spur straight, slender, tubular acuminate, mouth oblique, side lobes of lip 0, midlobe minute, acute.....2. *gracile*.

Spur of lip shorter than the lateral sepals:—

Stem 1—7 in. long, slender ; leaves linear, subacute, 1—1.5 in. long, .2 in. wide ; racemes simple or branched, longer than the leaves ; bracts minute, lanceolate, longer than the pedicel and ovary ; flowers .06—1 in. long sepals ovate, petals linear, spur saccate or subglobose, side lobes of lip small, rounded, midlobe oblong, concave.....3. *Jerdonianum*.
Stem short, stout ; leaves linear, apex very unequally bluntly or subacutely 2-lobed, 2—10 in. long, .25—6 in. wide ; racemes lateral, short, stout ; bracts broadly ovate ; flowers .2—3 in. long ; sepals and petals oblong or obovate, strongly incurved, side lobes of lip very small, midlobe broadly ovate, concave, fimbriately crose.....4. *pulchellum*.

1. SACCOLABIUM FILIFORME, Lindl.; F. B. I. vi. 56. *Sarcanthus filiformis*, Wt. Ic. t. 1684. *S. roseus*, Wt. Ic. t. 1685.
Nilgiri (Wight), Anamalai (Cotton), Pulney (Bourne, Saulière) Hills, 3,000—8,000 ft., and High Wavy Mountains (Blatter & Hallberg).
Flowers rose or orange-yellow streaked with crimson, or brick-red with an orange lip (Blatter).
2. SACCOLABIUM GRACILE, Lindl.; F. B. I. vi. 57.
Anamalai Hills; High Wavy Mountains (Blatter & Hallberg).
Rare.
Flowers white.
3. SACCOLABIUM JERDONIANUM, Reichb. f.; F. B. I. vi. 59. *Taenio-phyllum jerdonianum*, Wt. Ic. t. 1756.
Malabar (Jerdon); Travancore, Udambanshola at 5,000 ft. (Meebold); Tinnevely at Naterikal (Barber).
Rare.
4. SACCOLABIUM PULCHELLUM, Fischer n. comb. *S. nilagiricum*, Hook. f.; F. B. I. vi. 60. *Vanda pulchella*, Wt. Ic. t. 1671.
Nilgiri Hills and Quilon (Wight); Travancore (Johnson); Pulney Hills at 6,000 ft. (Anglade, Bourne); Tinnevely Hills (Barber); High Wavy Mountains (Blatter & Hallberg).
Flowers green or yellowish passing into white, dashed with purple.

32. *Acampe*, Lindl.

Epiphytic herbs; stems usually long and stout. *Leaves* thickly coriaceous, keeled, distichous, apex oblique. *Flowers* corymbose, often paniced, fleshy. *Sepals* and *petals* flat, subsimilar, the lateral sepals adnate to the usually small spur, dorsal sepal often slightly larger than the lateral. *Lip* upcurved, saccate or spurred, adnate to the column, often tubercled or pubescent within. *Column* short, thick; foot 0. *Anther* 2-celled; pollinia 2, waxy, globose; caudicle slender, longer than the pollinia; gland small, rotund.

Stem 12—18 in. long, stout; leaves strap-shaped; apex unequally bluntly 2-lobed, 4—9 in. long, .6—1.4 in. wide; peduncles supra-axillary, stout, with several cupular sheaths; flowers .3 in. long, paniced; panicles 1.5—5 in. long; sepals elliptic or obovate-oblong, petals obovate; side lobes of lip small, rounded; midlobe ovate, obtuse, papillose; spur a short rounded sac.....1. *Wightiana*.
Stem short, very stout; leaves narrowly strap-shaped, apex unequally 2-lobed with usually a mucro between, 6—8 in. long; scape 1.5—2 in. long; flowers crowded, .4 in. long; sepals and petals oblong, spur saccate or shortly conical, hairy within, side lobes of lip very small, midlobe rhomboid with acute angles, papillose above.....2. *congesta*.

1. ACAMPE WIGHTIANA, Lindl. *Saccolabium Wightianum*, Hook. f.; F. B. I. vi. 62. *S. praemorsum*, Hook. f. vi. 62. *Vanda Wightiana*, Wt. Ic. t. 1670. *Epidendrum praemorsum*, Roxb.; Cor. Pl. t. 43.
W. Ghâts (Wight); Circars (Roxburgh); Godavari District at Kota (Narayanswami).
Flowers yellow, barred with red; lip white with red stripes.

2. *ACAMPE CONGESTA*, Lindl. *Saccolabium congestum*, Hook. f.; F. B. I. vi. 63. *S. papillosum*, Wt. Ic. t. 1672.

Malabar (Wight).

Flowers white, tinged with yellow and purple.

33. *Sarcanthus*, Lindl.

Epiphytic herbs; stems usually elongate. *Leaves* fleshy, terete or flat. *Flowers* small in extra-axillary racemes or panicles. *Sepals* subequal. *Petals* rather smaller. *Lip* adnate to the base of the column or its foot, spur funnel-shaped, sometimes dilated near the mouth, divided by a longitudinal septum into 2 loculi for part of its length, usually with calli on both walls, side lobes small, midlobe small, triangular or hastate. *Column* short, stout; foot 0, short or long. *Anther* depressed, 2-celled; pollinia 2, bifid.

SARCANTHUS PENINSULARIS, Dalz.; F. B. I. vi. 67. *S. pauciflorus*, Wt. Ic. t. 1747.

W. Ghâts.

Stem slender, pendulous, leafy, 10—12 in. long; leaves linear, straight or falcately curved, obtusely acuminate, narrowed at the base, 2.5—6 in. long, .2—3 in. wide; sheaths ribbed; racemes shorter than the leaves; flowers yellow with red margins, lip white or yellowish, the side lobes often purple, sepals elliptic, obtuse, .16 in. long, petals smaller, spatulate, side lobes of lip small, acute, midlobe incurved, acute, spur conical, subacute, dilated above.

34. *Cleisostoma*, Blume.

Epiphytic herbs; stems usually elongate, leafy. *Leaves* fleshy, flat or terete. *Flowers* in extra-axillary racemes or panicles. *Sepals* and *petals* subequal, rather small, spreading. *Lip* adnate to the foot of the column, usually upcurved, 3-lobed, or the side lobes indistinct, spurred, spur conical or saccate with a callus plate within on the back wall, side lobes of lip erect, midlobe spreading or recurved. *Column* short; foot very short. *Anther* 2-celled; pollinia 2.

Stem 1—2 ft. long, rather slender; leaves scattered, oblong, apex rounded, entire or notched, base cordate, 1—2 in. long, .4—6 in. wide; flowers .3 in. long, on a short, stout, leaf-opposed peduncle; sheaths cupular; bracts cymbiform; sepals and petals oblanceolate, obtuse, side lobes of lip rather large, crenulate, midlobe sub-3-lobed, with a fleshy callus or with 2 ridges on the disk.....1. *tenerum*. Stem 1—2 in. long; leaves distichous, imbricate, linear, apex unequally bluntly 2-lobed, slightly narrowed at the base, 3—9 in. long, .6—1 in. wide; racemes rather stout, simple or branched, 2—5 in. long, sheaths cupular; bracts minute, lanceolate, acuminate; flowers .16 in. long; sepals and petals obovate, obtuse, side lobes of lip indistinct, midlobe orbicular-ovate, spur saccate, slightly inflated at the apex, with a callus plate on the back wall.....2. *Mannii*.

1. *CLEISOSTOMA TENERUM*, Hook. f.; F. B. I. vi. 73. *Oeceoclades tenera*, Wt. Ic. t. 1683.

Nilgiris: Sispara Ghât at 5,000 ft. (Gamble); Pulney Hills: Kodaikanal at 7,000 ft. (Anglade, Bourne); High Wavy Mountains (Blatter & Hallberg).

Flowers yellow or green with red nerves, lip white.

2. *CLEISOSTOMA MANNII*, Reichb. f.; F. B. I. vi. 74; Hook. f. Ann. Calc. v. t. 86.

Vizagapatam: Palkonda Hills at 1,500 ft. (Gamble).

Flowers yellow flushed with red.

35. *Taeniophyllum*, Blume.

Small epiphytic herbs; stem very short or 0, usually leafless. *Flowers* very small, usually in short few to many-flowered spikes. *Sepals* and *petals* subequal, free or united at the base. *Lip* sessile, saccate or spurred, side lobes small, broad, midlobe more or less fleshy, spur naked within. *Column* very short, broad; foot 0. *Anther* 2-celled; pollinia 4; strap short or long; gland small or fairly large.

TAENIOPHYLLUM SCABERULUM, Hook. f.; F. B. I. vi. 77.

Travancore at Kottayam (Johnson). Very rare.

Roots filiform; peduncle .5 in. long, scaberulous; bracts broadly ovate; flowers under .1 in. long; sepals, petals and lip united at the base, lip deeply saccate with a minute incurved lobe.

36. *Diplocentrum*, Lindl.

Epiphytic herbs; stem short, leafy. *Leaves* distichous, narrow, fleshy, subterete or complicate. *Scapes* lateral, simple or branched. *Flowers* rather small, in subspiciform racemes. *Sepals* and *petals* similar, the lateral sepals usually somewhat larger. *Lip* sessile, jointed on the base of the column, spreading, entire, with 2 short spurs, epichyle fleshy. *Column* very short, truncate, 2-auricled; foot 0. *Anther* 2-celled; pollinia 2, ovoid, sulcate or 2-partite; caudicle broad; gland broad.

Stem 2—6 in. long; leaves linear, keeled, apex unequally bluntly 2-lobed, 3—6 in. long, .2—35 in. wide; panicles 5—10 in. long; lateral sepals ovate, slightly falcate, lip with 2 short narrowly conical incurved parallel spurs, epichyle oblong, rounded, disk with a median thick fleshy ridge forking near the apex

1. *recurvum*.
Stem 2—6 in. long; leaves linear, apex unequally bluntly 2-lobed, 2—6 in. long, .2—6 in. wide; panicles 5—10 in. long; lateral sepals broadly ovate, lip with 2 very short saccate-oblong, straight, slightly divergent spurs, epichyle lanceolate truncate, disk naked, somewhat thickened at base on either side.....2. *congestum*.

1. *DIPLOCENTRUM RECURVUM*, Lindl.; F. B. I. vi. 78; Wt. Ic. t. 1680. *D. longifolium*, Wt. Ic. t. 1681.

Hills of South India from Horsleykonda (Gamble, Fischer) and Nundidroog to Tinnevely and Travancore.

Flowers pink and brownish tinged with pink.

2. *DIPLOCENTRUM CONGESTUM*, Wt. Ic. t. 1682; F. B. I. vi. 78.

Western Gháts, not common.

Flowers coloured as those of the last species.

37. *Podochilus*, Blume.

Small epiphytic herbs; stems tufted. *Leaves* many, distichous, small, flat or equitant and laterally compressed. *Peduncles* terminal or leaf-opposed. *Flowers* small or minute, racemed or spicate. *Lateral sepals* adnate to the foot of the column and forming a mentum. *Petals*

free, broad or narrow. *Lip* jointed to the foot, clawed or not, entire or somewhat 3-lobed, erect with a basal appendage. *Column* short; foot well developed; rostellum bifid or 2-partite. *Anther* erect; pollinia 4; caudicle widened upwards; gland small.

PODOCHILUS FALCATUS, Lindl.; F. B. I. vi. 80. *P. malabaricus*, Wt. Ic. t. 1748, fig. 2; F. B. I. vi. 80.

Wynaad (Drew, Barber); Malabar (Jerdon); Kavalay in Cochin at 2,000 ft. (Meebold); Travancore (Johnson).

Stem 3—12 in. long, fleshy; leaves broadly ensiform, obtuse, .5 in. long, imbricating and covering all the stem except the base; spikes slender, terminal, or terminal and lateral up to 1.5 in. long; bracts ovate-lanceolate, acuminate; flowers 5—12, white tipped with pink; lateral sepals ovate-lanceolate, dorsal, and petals lanceolate, mentum small, lip ovate-lanceolate, constricted in the middle, obtuse.

38. *Thelasis*, Blume.

Small epiphytic herbs; pseudobulbous with 1 or 2 leaves or with short compressed stems and several leaves. *Leaves* jointed on the sheath. *Scape* from the base of the pseudobulb or lateral on the stem, with 1—3 sheaths. *Flowers* very small, spicate. *Sepals* and *petals* similar, the latter smaller. *Lip* sessile on the base of the column, entire. *Column* very short; foot 0. *Anther* 2—4-celled; pollinia 8 in 2 groups of 4, minute, globose; caudicles long, filiform; gland small.

THELASIS PYGMAEA, Lindl.; F. B. I. vi. 86; King & Pantl. Ann. Calc. viii. t. 331. *Euproboscis pygmaea*, Griff.; Wt. Ic. t. 1732.

Malabar (Jerdon); Anamalai Hills; Karanir at 1,900 ft. (Fischer). Pseudobulb globose, .3—5 in. in diam.; leaves 1—2, linear, .8—2.5 in. long, .1 in. wide; scape slender, up to 3 in. long, straight or curved; sheaths up to .3 in. long; bracts ovate, acuminate; flowers hardly .1 in. long, greenish; dorsal sepal ovate-lanceolate, lateral linear-oblong, lip ovate, acute, contracted towards the tip.

39. *Vanilla*, Swartz.

Stout, terrestrial climbing, branched herbs; branches emitting adventitious roots; leafy or leafless. *Leaves* when present coriaceous or fleshy. *Racemes* usually axillary, subsessile or peduncled. *Flowers* large. *Sepals* and *petals* subequal, spreading. *Lip* adnate by a claw to the base of the column and embracing it in its concave limb, entire or 3-lobed. *Column* elongate; foot 0. *Anther* incumbent, cells separate; pollen granular. *Capsule* long, fleshy, 1-celled.

Stem very thick; internodes 3—4 in. long; abortive leaves lanceolate, acuminate, .5—1.5 in. long; bracts ovate, acute, .25—4 in. long; flowers 2 in. long; sepals and petals oblong-lanceolate, subobtusate, petals slightly the wider, undulate, lip entire, ovate-oblong, subacute, undulate, disk with 2 median puberulous lines

1 *Walkeria*.

Stem thick; internodes 2—4 in. long; leafless; bracts broadly ovate, subacute, about .2 in. long; flowers 1 in. or less long; sepals and petals oblong-lanceolate, subacute, lip 3-lobed, side lobes broad, rounded, midlobe rotund-ovate, subacute, disk with a median hirsute line and two densely retrorsely barbate crests

2. *Wightiana*.

1. VANILLA WALKERIEAE, Wt. Ic. t. 932; F. B. I. vi. 90.
Travancore near Quilon (Wight); Jirganhalli in North Coimbatore at 3,000 ft. (Fischer).
Flowers white. Vern. *Kan.* Gundunallai.
2. VANILLA WIGHTIANA, Lindl.; F. B. I. vi. 90. *V. aphylla*, Wt. Ic. t. 931.
Travancore (Wight, Calder and Ramaswami).
Flowers white.

40. *Corymborchis*, Thouars.

Tall terrestrial, rigid, leafy herbs. *Leaves* broad, plaited. *Flowers* in axillary, sessile, spreading panicles. *Sepals* and *petals* subequal, linear or spatulate, at first cohering in a tube with spreading tips. *Lip* erect from the base of the column, linear, channelled, tip expanded and recurved. *Column* elongate, terete; apex clavate and 2-lobed or -auricled; rostellum at length 2-fid, foot 0. *Anther* narrow, acuminate, about as long as the rostellum, 2-celled; pollinia 2, clavate; caudicle subulate; gland peltate.

CORYMBORCHIS VERATRIFOLIA, Bl. *Corymbis veratrifolia*, Reichb. f.; F. B. I. vi. 91; King & Pantl. Ann. Calc. viii. t. 354.

Nilgiris (Thomson); Courtallam (Wight); Tinnevely District at Kannikatti (Barber); Cuddapa District (Beddome).

Stem up to 4 ft. high; leaves elliptic-lanceolate, caudate-acuminate, nearly sessile on the sheaths, 12—18 in. long, 3—4 in. wide; panicles 4—6 in. long; flowers 1—1.25 in. long, greenish-white; sepals and petals linear-oblongate, lip linear with the end expanded into an orbicular, apiculate recurved lobe.

41. *Tropidia*, Lindl.

Terrestrial leafy herbs; stems often branched. *Leaves* membranous, sessile, subplicate. *Flowers* small, in axillary or terminal, sessile or peduncled spikes. *Sepals* and *petals* subequal, the lateral sepals more or less connate. *Lip* sessile on the base of the column and parallel to it, cymbiform or spurred, entire, tip acute or reflexed, disk lamellate. *Column* rather short; foot 0; rostellum long, at length 2-fid. *Anther* short, erect, 2-celled; pollinia 2, clavate, 2-cleft; caudicle short or long; gland small.

TROPIDIA ANGULOSA, Bl.; F. B. I. vi. 92; King & Pantl. Ann. Calc. viii. t. 365. *Govindooia nervosa*, Wt. Ic. t. 2090.

Bababudan Hills (Law); Courtallum (Wight).

Stem 8—12 in. long, sheathed below the leaves; leaves 2—3, elliptic to broadly ovate, acuminate, base rounded or cordate, 3—6 in. long, 1.5—3 in. wide; peduncles terminal, slender in flower, up to 2 in. long; spikes many-flowered, 1—2 in. long; bracts linear, slender, spreading, .4—.75 in. long; flowers .5—.75 in. long, white; lateral sepals lanceolate, acuminate, connate nearly to the apex, forming a mentum and enclosing the lip and spur, dorsal sepal narrower, petals ovate-lanceolate, lip oblong, obtuse, spur cylindric.

42. *Anoechtochilus*, Blume.

Terrestrial leafy herbs; stems creeping below. *Leaves* petioled, ovate or lanceolate, often coloured. *Flowers* moderate-sized in erect spikes. *Sepals* and *petals* free, the dorsal sepal forming a hood with the petals, the lateral spreading. *Lip* adnate to the base of the column, base spurred, side lobes small, midlobe contracted above the spur into an entire, toothed or pectinate claw, apex expanded into 2–4 wing-like lobes, spur exserted beyond the bases of the lateral sepals with 2 calli within. *Column* short, with 2 appendages in front which plunge into the spur; foot 0. *Anther* 2-celled; pollinia 2; caudicle long or short.

ANOECHTOCHILUS ELATIOR, Lindl.; F. B. I. vi. 95.

W. Ghâts in or near evergreen forests, 3,000–6,000 ft.

Stem up to 8 in. long; leaves orbicular-ovate, acute, base rounded, 1–3 in. long, often velvety dark-green with golden nerves; petiole above the loose short sheath, .3–.5 in. long; scape slender, glandular pubescent, as are the spike, bracts, pedicels and ovaries, up to 12 in. long, with 2–3 lanceolate sheaths; spike short, 2–12-flowered; bracts ovate-lanceolate, .5 in. long; flowers pink; lip as long as the sepals, claw fimbriate, terminal lobes oblong, shorter than the claw, spur funnel-shaped, acute; appendage of column large, didymous, hatchet-shaped.

43. *Odontochilus*, Blume.

Terrestrial leafy herbs; stem creeping below. *Leaves* petioled. *Flowers* terminal, solitary, or on a few- to many-flowered spike. Dorsal *sepal* forming a hood with the petals, lateral more or less connate at the base and concealing the spur. *Lip* adnate to the base of the column, contracted beyond the spur or sac into a claw, apex lobed. *Column* short; foot 0. *Anther* 2-celled, pointed; pollinia 2, rarely 4.

ODONTOCHILUS ROTUNDFOLIUS, Blatt. in Journ. Bomb. Nat. Hist. Soc. xxxii, 521.

High Wavy Mountains in evergreen forest (Blatter & Hallberg). Stem nodose, 6 in. high, hairy with hairs from bulbous bases; leaves few, almost orbicular, mucronate, up to .4 in. in diam.; petiole about as long, amplexicaul; flower solitary, about .4 in. long; sepals erect, oblong, petals shorter, oblong, acuminate, subfalcate, lip with a minute subsaccate spur, claw broad, entire, limb with 2 rounded side lobes and a clawed apical bifid lobe.

44. *Spiranthes*, L. C. Rich.

Terrestrial herbs; roots fibrous or tuberous; stems erect, leafy, or the flowering leafless. *Leaves* usually narrow. *Flowers* small, in erect, secund, often twisted, many-flowered spikes. *Sepals* subequal, free, the lateral gibbous at the base, and inserted obliquely on the ovary, more or less cohering with the similar petals in an erect hood. *Lip* erect, sessile or clawed, entire or 3-lobed, base concave, disk bearing calli or lamellæ. *Column* short, terete, base often decurrent on the ovary; foot 0. *Anther* erect, 2-celled; pollinia 2, 2-partite, pendulous.

SPIRANTHES SINENSIS, Ames. *S. australis*, Lindl.; F. B. I. vi. 102; Wt. Ic. t. 1724 (middle and right-hand figures); King & Pantl. Ann. Calc. viii. t. 369.

In the hills, 5,000—8,000 ft., in open dry grass-lands and in swampy places.

6—18 in. high; leaves 4—5, usually clustered near the base of the stem, linear-lanceolate to oblanceolate, obtuse or acute, 1·5—5 in. long, 2—5 in. wide, shortly sheathing, sometimes distinctly petioled; flowers 1—2 in. long, white or pink, in glandular-pubescent spikes 1·5—9 in. long; rhachis spirally twisted; sepals ovate-oblong, petals linear, lip sessile, 3-lobed, dilated at base and apex, base subsaccate, 2-glandular, apex subquadrate, truncate, retuse, crenulate.

Var. *Wightiana*, Lindl.; F. B. I. vi. 102; Wt. Ic. t. 1724 (left-hand figure). Stouter, sheaths many, almost imbricating; flowers in a dense cylindric spike.

Nilgiri Hills.

45. *Cheirostylis*, Blume.

Small leafy terrestrial herbs; stems decumbent and succulent at the base. *Leaves* membranous, petioled. *Flowers* small, few, racemed. *Sepals* united to the middle into a ventricose tube. *Petals* shorter, narrow. *Lip* inserted at the base of the column, erect, base saccate or cymbiform, sac with contained calli or setae, epichyle shortly clawed, apex dilated, 2-lobed, margin entire, toothed or fimbriate. *Column* short, with 2 appendages in front; foot 0; rostellum 2-cleft. *Anther* erect, 2-celled; pollinia 2, 2-partite; caudicle short; gland oblong.

CHEIROSTYLIS FLABELLATA, Wt.; F. B. I. vi. 105. *Monochilus flabellatum*, Wt. Ic. t. 1727.

Nilgiri and Pulney Hills at 6,000 ft. and upwards, growing in the humus of shady woods.

A delicate plant 4—9 in. high, probably saprophytic; leaves 4—5, thin, ovate or subrotund, acute, base rounded or subcordate, 3-ribbed, 5—1 in. long, brown tinged with red; sheaths hyaline, truncate, inflated; scape slender, glandular-pubescent; sheaths few, loose, acuminate; racemes short; flowers white, glandular-pubescent, less than 5 in. long; sepals ovate-oblong, petals linear-oblong, lip with a short saccate claw, limb spreading, suborbicular, deeply 2-lobed, the lobes sub 5-fid.

46. *Zeuxine*, Lindl.

Terrestrial herbs; stems creeping below. *Leaves* membranous. *Flowers* small in terminal racemes or spikes. *Sepals* subequal, lateral, free, enfolding the base of the lip, dorsal concave, cohering with the petals in a hood. *Lip* adnate to the base of the column, saccate or cymbiform, with a sessile or clawed entire or 2-lobed limb. *Column* short, with or without 2 processes in front; foot 0. *Anther* membranous, cells 2, contiguous; pollinia 2, pyriform with a common caudicle; gland oblong.

Leaves linear, acuminate, clasping, .75—3 in. long, .08—25 in. wide, sessile or truncate on the sheaths. Stem passing into the peduncle; leaves many passing gradually into linear bracts; racemes dense-flowered, .5—3 in. long; lateral sepals obliquely ovate-oblong, dorsal ovate, petals falcately oblong, lip not longer than the sepals, claw dilated, limb semiorbicular, sac small.....1. *strateumatica*.
Leaves ovate:—

Stem short; leaves few, ovate or ovate-oblong, acute, base rounded, .8—1.75 in. long, .3—6 in. wide, shortly petioled; sheaths short, hyaline, inflated; scape with few-flowered glandular-pubescent spike 4—10 in. long, slender, pubescent; sheaths 2—3, distant, lanceolate; sepals oblong, pubescent, lip twice as long as the sepals, basal sac with 2 spurs within, claw gradually dilated into the deeply 2-lobed, obovate-cuneate limb, lobes crenulate or coarsely toothed

2. *longilabris*.

Stem short; leaves few, ovate or ovate-lanceolate, acute, base rounded, .9—1.75 in. long, .5—75 in. wide; petiole short; sheaths hyaline, inflated; scape slender, pubescent, with the many-flowered, glandular pubescent spike 5—10 in. long; sheaths 2—3, distant, lanceolate, convolute, acuminate; bracts linear-lanceolate, acuminate, as long as the pubescent ovary; dorsal sepal saccate at base, lateral slightly shorter, ovate-lanceolate, lip lightly longer than the dorsal sepal, basal sac naked within, limb sessile, of 2 orbicular entire wings separated by a shallow apical sinus.....3. *Blatteri*.

1. ZEUXINE STRATEUMATICA, Schltr. *Z. sulcata*, Lindl.; F. B. I. vi. 106; King & Pantl. Ann. Calc. viii. t. 381. *Z. brevifolia*, Wt. Ic. t. 1725. *Z. robusta*, Wt. Ic. t. 1726.

Ganjam (Barber); Mysore (Jerdon); Walaiyar at 800 ft. (Fischer).

Stem 2—12 in. long; flowers white.

2. ZEUXINE LONGILABRIS, Benth.; F. B. I. vi. 107. *Monochilus affine*, Lindl.; Wt. Ic. t. 1728.

W. Gháts from the low country (Bourdillon) to 4,000 ft. (Fischer). High Wavy Mountains (Blatter & Hallberg).

Stem under 2 in. long; flowers white or (Blatter) olive with lip white and column orange.

3. ZEUXINE BLATTERI, Fischer in K.B. 1928 ined.

High Wavy Mountains in damp forest (Blatter & Hallberg).

Stem 3—6 in. long, rooting; sepals greenish with pale tips, petals pale pink, sac of lip orange, the limb white.

47. *Goodyera*, R. Br.

Terrestrial leafy herbs; roots fibrous, stem creeping below. Leaves petioled, often coloured. Flowers small, in terminal, sometimes twisted spikes. Sepals subequal, dorsal erect, concave, forming a hood with the narrow petals, lateral sepals free, erect or spreading. Lip inferior, sessile on the base of the column, base cymbiform or saccate, often setose within, limb entire, narrowed or acute at the apex. Column usually short, top cupular; foot 0. Anther 2-celled, cells distinct; pollinia 2, granular, pendulous; caudicle present or absent.

GOODYERA PROCERA, Hook.; F. B. I. vi. 111; Wt. Ic. t. 1729; King & Pantl. Ann. Calc. viii. t. 378.

West Coast and W. Gháts; Seshachalam Hills in the Cuddapah District at 2,500 ft. (Fischer).

Plant up to 30 in. high; leaves lanceolate, acute or obtuse, base narrowed, 1.5—8 in. long, 1—2.5 in. wide; petiole stout, 1—2 in.

long; sheath short, loose; spike 2—9 in. long, dense-flowered; bracts lanceolate, acuminate, .3 in. long, as long as the white, fragrant flowers; sepals broadly ovate, petals spathulate, lip saccate, sac softly setose within, and with 2 large calli, limb recurved, truncate.

48. *Hetaeria*, Blume.

Leafy terrestrial herbs; stem creeping below. *Leaves* petioled. *Flowers* small, in terminal, many flowered spikes, not inverted. *Sepals* free, the dorsal forming a hood with the narrower petals, the lateral embracing the base of the lip. *Lip* superior, adnate to the sides of the column, base cymbiform or subsaccate, warted within, limb usually small. *Column* short, with 2 parallel processes below; rostellum 2-toothed; foot 0. *Anther* short, 2-celled; pollinia 2, 2-lobed.

HETAERIA OVALIFOLIA, Benth.; F. B. I. vi. 115. *Goodyera ovalifolia*, Wt. Ic. t. 1730.

Courtallam in dense forest (Wight).

Whole plant 1—2 ft. high; leaves membranous, broadly elliptic, acute, base rounded, 3- or 5-ribbed, 2—4 in. long, .75—2 in. wide, often tinged with purple; petiole .5—1 in. long; sheath short, loose; scape pubescent; sheaths several, lanceolate, acuminate; spike slender, 3—4.5 in. long; rhachis, pedicels and ovaries glandular-pubescent; bracts linear-lanceolate, acuminate, .25—3 in. long; flowers white tinged with pink; sepals broadly ovate, petals obovate-oblong, lip saccate, obtusely 3-toothed, nerves with toothed calli near the base.

49. *Aphyllorchis*, Blume.

Terrestrial leafless herbs; stem simple, sheathed. *Flowers* moderate-sized, in terminal lax racemes or spikes. *Sepals* and *petals* subequal, the latter narrower. *Lip* sessile or shortly clawed on the base of the column, oblong, entire or 3-lobed. *Column* rather long; foot 0. *Anther* 2-celled, cells centigenuous; pollinia 2, 2-lobed.

APHYLLORCHIS MONTANA, Reichb. f.; F. B. I. vi. 116; King & Pantl. Ann. Calc. viii. t. 349.

Mysore at Cadamanay (Barber); Anamalai Hills; Karianshola in dense evergreen forest at 2,500 ft. (Fischer).

A saprophytic, chlorophyllless plant up to 2 ft. high; sheaths near the base of the stem tubular, loose and close together, becoming smaller, lanceolate, more compact and distant upwards; racemes 4—8 in. long; flowers about .75 in. long, straw-coloured with purple tips; sepals and petals linear-oblong, obtruse, lip narrowly obovate-oblong, narrowed towards the obtuse apex, side lobes rounded at base, claw subsaccate, short, broad, with 2 linear calli.

50. *Nervilia*, Comm. ex Gaud.

Terrestrial tuberous 1-leaved herbs. *Leaf* appearing after the flowers, broadly cordate to orbicular, plicate. *Flowers* solitary or few

to many, racemose. *Sepals* and *petals* subequal, narrow. *Lip* inferior, adnate to the base of the column, sessile or almost clawed, entire, 2-fid or 3-lobed, sometimes slightly saccate at the base. *Column* elongate, broadening upwards; foot 0. *Anther* substipitate; pollinia 2, 2-fid, or 4, powdery; caudicle and gland absent.

Scape 1—3-flowered:—

Lip entire, apex emarginate, base slightly saccate. *Leaf* lying flat on the ground, broadly ovate or suborbicular, obtuse, acute or shortly acuminate, base cordate, many-ribbed, 2—4 in. long, dark-green mottled with purplish-brown, more or less coarsely hairy; scape 3—6 in. long; sheaths 2—3, tubular; flowers 2 or 3, about .65 in. long; sepals and petals linear-lanceolate, acuminate...1. *plicata*. *Lip* obovate, obtuse, 3-lobed about the middle, midlobe emarginate, crisped, not saccate. *Leaf* unknown; flowers 2, about .9 in. long; sepals and petals narrowly oblanceolate, acuminate.....2. *biflora*.

Scape many-flowered:—

Leaf orbicular, apex cuneate, base cordate, 7—9 ribbed, margin entire, 1.5—2.5 in. diam.; sepals and petals oblong-lanceolate, acuminate, about .6 in. long, lip 3-lobed about the middle, not saccate, side lobes small, rounded, midlobe ovate-oblong, subobtuse, crenulate, glabrous.....3. *carinata*. *Leaf* orbicular or subreniform, cuspidate, base cordate, 13- or more-ribbed, margin waved, almost coarsely dentate, 4—10 in. diam; petiole 4—8 in. long; flowers about .66 in. long; sepals linear-lanceolate, acute, petals narrower, obtuse, lip 3-lobed about the middle, side lobes obtuse, midlobe ovate, acute, crisped, hairy.....4. *Aragoana*.

1. *NERVILIA PLICATA*, Schltr. *Pogonia plicata*, Lindl.; F. B. I. vi. 119; King & Pantl. Ann. Calc. viii. t. 358.
Rampa Hills at 1,500—2,000 ft. (Narayanswami); Mysore: Chikkenhalli at 3,000 ft. (Meebold); Travancore (Calder & Ramaswami).
Sepals and petals yellowish-green, lip lilac with a yellow median line and a basal green spot.
2. *NERVILIA BIFLORA*, Schltr. *Pogonia biflora*, Wt. Ic. t. 1758; F. B. I. vi. 119. Wynaad (Jerdon).
Sepals and petals white, lip pale pink.
3. *NERVILIA CARINATA*, Schltr. *Pogonia carinata*, Lindl.; F. B. I. vi. 121; Hook. f. Ann. Calc. v. t. 94; Duthie Ann. Calc. ix. t. 124.
Mysore (Stocks); Pulney Hills (Bourne); Cochin (Wight).
Sepals and petals pale green, lip pale greenish-yellow with purple veins and spots.
4. *NERVILIA ARAGOANA*, Gaud. *Pogonia flabelliformis*, Lindl.; F. B. I. vi. 121; Duthie Ann. Calc. ix. t. 125. *P. carinata*, Wt. Ic. t. 1720.
Rampa Hills (Ramaswami); Pulney Hills (Bourne); Travancore (Calder & Ramaswami).
Sepals and petals pale green veined with purple, lip white, veined with purple, tinged with yellow near the base.

51. *Didymoplexis*, Griffith.

Slender saprophytic, leafless, tuberous, terrestrial herbs; rhizome fleshy. *Scape* simple; flexuous; raceme few-flowered; pedicels greatly elongated in fruit. *Sepals* and *petals* connate into a 2-lipped tube, the dorsal sepal and the petals forming a 3-fid upper lip, the lateral

sepals a 2-fid or entire lower lip and forming a mentum with the foot of the column. *Lip* inserted on the foot of the column, short, broad, entire, base and disk with small calli. *Column* long, broadened upwards into 2 narrow wings and 2-toothed; foot distinct. *Anther* low, shortly stipitate; pollinia 4, reniform; caudicle and gland absent.

DIDYMOPLEXIS PALLENS, Griff.; F. B. I. vi. 122; King & Pantl. Ann. Calc. viii. t. 346. *Apetalon minutum*, Wt. Ic. t. 1758.

Coorg at Sultan's Battery (Jerdon). Rare.

Stem 4—6 in. long; sheaths loose; raceme terminal, 4—8-flowered; flowers dull yellowish-white, .33 in. diam.; lip stipitate, membranous, transversely or obcuneately oblong, disk papillose.

52. Epipogum, Gmelin.

Saprophytic, leafless, brownish, terrestrial herbs; roots tuberous or coralloid; stem erect, sheathed. *Flowers* laxly racemed. *Sepals* and *petals* subequal, narrow, free, erect or spreading. *Lip* sessile at the base of the column, broad, entire or 3-lobed, spurred, disk with rows of papillæ. *Column* short; foot 0. *Anther* thick, dorsally 2-celled; pollinia 2, each with a long, filiform caudicle; gland small.

EPIPOGUM NUTANS, Reichb. f.; F. B. I. vi. 124; King & Pantl. Ann. Calc. viii. t. 335. *Podanthera pallida*, Wt. Ic. t. 1759.

Coorg (Jerdon, Barber); Bolampatti Hills at 4,500 ft. (Fischer); Anamalai Hills (Barber); Pulney Hills at 5,000 ft. (Anglade).

10—24 in. high; root an oblong tuber; stem whitish- or pale-brown; sheaths short, inflated, truncate; raceme terminal, few- to many-flowered; bracts large, membranous, oblong, acute; flowers pale yellow or pinkish-white, speckled and stained with pink; sepals and petals narrowly lanceolate, .5—·7 in. long, lip entire; disk with 2 or 3 glandular ridges.

53. Epipactis, Adans.

Terrestrial, leafy herbs. *Leaves* sessile, plaited. *Flowers* racemose; bracts large, leafy. *Sepals* and *petals* broad, acuminate, strongly nerved. *Lip* sessile on the base of the column, hypochile concave or saccate, epichile contracted at the base, entire. *Column* long or short; foot 0. *Anther* erect, obtuse, 2-celled, cells contiguous; pollinia 2, 2-partite; gland globose.

EPIPACTIS CONSIMILIS, Wall.; F. B. I. vi. 126; King & Pantl. Ann. Calc. viii. t. 364.

Nilgiri Hills at Deva Shola (Lawson). Rare.

Stem 1—2 ft. high; leaves elliptic or lanceolate, obtuse or acuminate, 3—7 in. long, 1—2 in. wide, smaller upwards and passing into the large foliaceous bracts; rhachis of lax-flowered raceme pubescent; flowers, sometimes appearing solitary owing to the leaf-like appearance of the bracts, 1—1.5 in. diam.; lateral sepals falcate ovate, acute, lip nearly as long as the sepals, hypochile trough-shaped, warted within, epichile contracted at the base, then broadly lanceolate, acuminate. Sepals and petals lavender with white hairs without, green striped with brown within, hypochile purple, epichile pale brown, the apex white.

54. *Habenaria*, Willd.

Terrestrial, erect, usually leafy, unbranched herbs; roots of simple or lobed tubers and fleshy radical fibres. *Leaves* 2-many, not plaited, radical or cauline, scattered or clustered. *Flowers* 1-very many, usually terminal in spikes or racemes. *Sepals* unequal, the lateral often much larger, deflexed, dorsal oblong or ovate, more or less arched. *Petals* simple and subequal to the sepals or 2- (rarely 3-) lobed or -partite, segments often filiform. *Lip* entire, 3-lobed or 3-partite. *Spur* long, sometimes very long. *Column* erect, short; foot 0. *Anther* 2-celled, cells parallel or diverging, forming with the sides of the rostellum channels or tubes for the caudicles of the pollinia; pollinia 2, granular, with long or short caudicles and exserted, naked glands. *Stigma* 2-lobed or extended into 2 short or elongate, often clavate, papillose processes.

Petals 2-lobed or -partite:—

Stem leafy upwards:—

Petals entire at the base, 2-lobed above:—

Petals bearded, lip longer than the sepals:—

Plant 10—18 in. high; leaves 5—6 in the middle third of the stem, erect, ovate to narrow-lanceolate, acuminate, 1—3·5 in. long, 3—8 in. wide; raceme few-flowered; bracts foliaceous, sheathing; flowers about 8 in. long (excluding the spur and ovary); sepals ovate, acute or acuminate, lateral falcate, petals broader, pubescent, upper lobe much the longer, tips filiform, sinus not very deep, rounded, lip scabrid-pilose, linear at base, then 3-furcate, segments subulate, spur as long as the ovary

1. *barbata*.

Plant 10—18 in. high; leaves 3—5 in the middle third of the stem, erect, ovate- or elliptic-lanceolate, acute or acuminate, 1·5—3·5 in. long, 5—9 in. wide; raceme 5—10 flowered; bracts sheathing; flowers about 1·3 in. long (excluding the spur and ovary); sepals ovate-lanceolate, acuminate or caudate, petals longer, villose, lobes linear, elongate divaricate, sinus deep, lip glabrous, ligulate at base, then 3-furcate, segments linear, spur slender, as long as the ovary.....2. *Elwesii*.

Petals glabrous, lip not longer than the sepals. Stem 1—2 ft. high; leaves erect, linear-lanceolate, setaceously acuminate, 1—4 in. long, 2—4 in. wide; raceme few- and distant-flowered; bracts large, cymbiform, setaceously acuminate; flowers subsecund; lateral sepals broadly ovate, obtuse, petals longer than the dorsal sepal, upper lobe filiform, twice as long as the subulate lower, lip 3-lobed, lobes broad, fleshy, obtuse, lateral divergent, spur clavate at the apex, slightly shorter than the ovary.....3. *acuminata*.

Petals 2-partite almost to the base:—

Stem 10—18 in. high; leaves oblong- or lanceolate-elliptic, acute narrowed to the base, 2·5—8 in. long, 1—2 in. wide; racemes up to 1 ft. long, many-flowered; bracts sheathing, much shorter than the beaked ovary; lateral sepals ovate-falcate, acute, lobes of the petals elongate-filiform, divaricate, lip 3-partite, segments elongate-filiform, lateral much the longer, all the filiform appendages fantastically contorted, spur much curved, shorter than the ovary, tip slightly clavate, subacute; anther-cells very large

4. *multicaudata*.

Stem 10—18 in. high; leaves ovate-lanceolate, 1—4·5 in. long, 5—1·3 in. wide, acute or acuminate, base narrowed; raceme cylindric, many-flowered, up to 6 in. long; bracts foliaceous, sheathing, as long as the whole flower; sepals ovate, acute, lateral narrower, subfalcate lobes of petals erect, the lower filiform, lip 3-partite, linear, spur about as long as the ovary...5. *digitata*.

Stem leafy only at or near the base:—

Plant 3—10 in. high; leaves 1 or 2, sessile, broadly ovate or suborbicular, obtuse or acute, base cordate, 5—2·5 in. long; scape usually naked, 1—4-flowered; bracts ovate, much shorter than the shortly pedicelled ovary; sepals

ovate, lateral oblique, acute, upper segment of the petals suborbicular, lower elongate-filiform, lip 3-partite, segments subequal, lateral filiform, median linear-lanceolate, spur slender, curved clavate at the tip, longer than the ovary

6. *grandiflora*.

Plant 2—10 in. high; leaves usually 3 or more, linear to linear-oblong, rarely ovate, narrowed to the sheath, sometimes complicate, 1—4.5 in. long, .2—1 in. wide; scape naked or with 1—2 sheaths, 1—4-flowered; bracts much shorter than the long-pedicelled ovary; sepals ovate, lateral slightly narrower, subfalcate, acute, upper lobe of petal obliquely ovate, acuminate, lower linear, longer, lip 3-partite, lateral segments linear, median shorter and broader, spur slender, curved, much longer than the ovary.....7. *rariflora*.

Petals entire:—

Bracts much smaller than the leaves, not concealing the buds:—

Midlobe of the lip entire, lobes not tailed:—

Side lobes of lip broad, midlobe narrower:—

Lip not or hardly longer than the lateral sepals:—

Side lobes of lip longer than or nearly as long as the midlobe, toothed or fimbriate:—

Spur not longer than the ovary:—

Sepals and petals puberulous:—

Stem 3—8 in. high, rather stout; leaves several in the lower third elliptic to broadly ovate, acute, apiculate, base broad, 1.2—3 in. long, .4—1.1 in. wide, decreasing upwards into loose, lanceolate, acuminate sheaths; raceme dense-flowered, 1.5—3 in. long; flowers scurfily pubescent within; lateral sepals obliquely ovate, petals shorter, broader, gibbous, lip cuneately obovate, midlobe linear, side lobes broad, fimbriate, spur shorter than the ovary.....8. *cephalotes*.

Stem up to 8 in. high, rather stout; leaves 3—4 in the lower third, lanceolate, acute, 1.5—2 in. long, decreasing into a few acute sheaths below the flowers; raceme about 2 in. long, lax-flowered; bracts lanceolate, acuminate, as long as the ovary; sepals ovate, acute, petals lanceolate, acute, crenulate-denticulate, lateral lobes of lip angulate, fimbriolate, median ligulate-lanceolate, slightly longer, spur subclavate, slightly shorter than the ovary

9. *denticulata*.

Sepals and petals quite glabrous. Stem 4—8 in. high, slender; leaves 3—5, near the base, linear to linear-oblong, acute or acuminate, 2—4 in. long .2—.5 in. wide; racemes 2—4 in. long, few- and lax-flowered, usually flexuous; sheaths clasping; flowers glabrous; lateral sepals ovate-oblong, subfalcate, acute, lip as broad as long, midlobe linear-lanceolate, side lobes cuneate-rhomboid, obliquely truncate, apical margin undulate or denticulate, spur equalling or shorter than the ovary.....10. *suaveolens*.

Spur much longer than the ovary:—

Ovary under 1 in. long, curved:—

Stem short, rather slender; sheaths lanceolate; leaves often subradial, elliptic to oblong-lanceolate, acute, 1—4 in. long, .3—6 in. wide; spike few- and lax-flowered; bracts lanceolate, usually shorter than the ovary; lip triangular-cuneate, side lobes lanceolate, deeply toothed on the outer margin, midlobe lingulate

11. *Richardiana*.

Stem short, rather stout; sheaths ovate; leaves ovate-lanceolate, acute, 2—3 in. long, .5—1 in. wide; spike many- and dense-flowered; bracts broad, sheathing, as long as the ovary; lip obcordate, side lobes semi-ovate, fimbriate, midlobe ligulate, usually short.....12. *fimbriata*.

Ovary over 1 in. long, straight, long-beaked. Stem 4—16 in. high; leaves cauline, linear-oblong or lanceolate, obtuse, acute or acuminate, 2—6 in. long, .4—1 in. wide; spike 2—8-flowered; bracts shorter than the ovary; lateral sepals ovate, subacute, petals lanceolate or linear-oblong, lip 3-partite, side lobes recurved-cuneate,

apex obliquely truncate, crenate or fimbriate, midlobe linear, slightly shorter, spur twice as long as the sessile ovary, stout, apex clavate.....13. *longicornu*.

Side lobes of the lip much shorter than the midlobe, entire. Leaves 3—6, appressed to the earth, sessile, broadly elliptic or orbicular, rounded or orbicular, rounded or acute, 1·5—5 in. long; scape 4—18 in. long; stout; sheaths many, lanceolate, acuminate; spike dense-flowered; bracts much shorter than the long-beaked ovary; sepals broadly-oblong, petals linear, side lobes of lip small, rounded, midlobe lanceolate, spur slender, clavate at the tip, longer than the ovary

14. *platyphylla*.

Lip distinctly longer than the lateral sepals:—

Lip not exceeding .5 in. Leaves radical, horizontal, lanceolate to oblong-elliptic, acute or obtuse, 1·5—6 in. long, .6—1·5 in. wide; scape 4—20 in. long; sheaths scarious, linear-lanceolate, acuminate; spike lax-flowered; bracts about half as long as the beaked ovary; sepals ovate, petals narrowly lanceolate, lip flabelliform, side lobes semi-ovate, entire or crenulate, midlobe linear, spur slender, as long as or a little longer than the ovary.....15. *plantaginea*.

Lip .7 in. or more long, spur very much longer than the ovary:—

Plant 8—30 in. high; leaves subradical, oblong to elliptic-lanceolate, acute, 1·5—6 in. long, .4—1·3 in. wide; scape with several large, convolute, acuminate sheaths; flowers 1—4; bracts convolute, sheathing the pedicels with the ovaries usually entirely exserted; lateral sepals obliquely ovate, petals linear-oblong, lip .8—1·1 in. long, puberulous, side lobes divaricate, cuneate, apex obliquely truncate, crenate or denticulate, midlobe linear, spur long, slender above, thickened from the middle to the subacute apex, reaching 5·5 in. long

16. *longicalcarata*.

Plant 4—18 in. high; leaves subradical or cauline, linear to elliptic-lanceolate, obtuse or acute, 1·5—5 in. long, .4—1 in. wide; scape with several lanceolate, finely acuminate sheaths; flowers 1—7; bracts lanceolate finely acuminate, shorter than the sessile, beaked ovary; lateral sepals ovate, petals lanceolate, acute, lip .7—·9 in. long, glabrous, side lobes rhomboid-cuneate, apex oblique, fimbriate, midlobe linear, spur long, very variable, slender or rather stout, thickened to the blunt apex, reaching 5 in. long.....17. *decipiens*.

Side lobes of lip filiform or linear, midlobe as broad or broader:—

Stem 2—3 ft. high, sheathed below, leafy above; sheaths below the spike bract-like, lanceolate, caudate; leaves oblong or oblong-lanceolate, finely acuminate, 2·5—6 in. long, .7—1·3 in. wide; spike 4—8 in. long, many-flowered; bracts 1—1·5 in. long, linear-lanceolate, setaceously acuminate, exceeding the body of the ovary without the beak; lateral sepals very gibbous, hatchet-shaped, shortly beaked, nearly .5 in. long, with several arched nerves, dorsal orbicular, hooded, shortly beaked, lip linear at base, then 3-lobed, side lobes filiform, midlobe shorter, linear, spur long, slender, incurved; beak of ovary slender, as long as or longer than the body.....18. *commelinifolia*.

Lateral sepals not gibbous, nerves straight or nearly so; ovary not or very shortly beaked:—

Stem leafy upwards:—

Bracts not cucullate; flowers not or hardly secund. Stem 6—18 in. high; leaves linear to elliptic, acuminate, very narrowly margined, 1—5 in. long, .3—·8 in. wide; spike cylindric, many-flowered, up to 4 in. long; bracts lanceolate, as long as or longer than the ovary; perianth puberulous, sepals broadly oblong, petals triangular-ovate, lip as long as the sepals, wedge-shaped, basal half entire, 3-lobed beyond the middle, lobes linear-lanceolate, outer margins of lateral lobes usually denticulate, spur as long as or slightly longer than the incurved, shortly beaked ovary.....19. *elliptica*.

Bracts cucullate; flowers secund. Plant 4—15 in. high; leaves subimbricate sheathing, ovate to linear, acute, .75—2.5 in. long; spike 2—4 in. long; bracts cymbiform, acuminate, sheathing the flowers, lower 1 in. long, smaller upwards; sepals subequal, obtuse, petals as long, narrower, lip as long, 3-partite, side lobes linear, obtuse, usually shorter than the broader midlobe, spur subclavate, as long as or shorter than the beakless ovary.....20. *Heyneana*.
Leaves radical or clustered at the middle or near the base of the stem :—
Leaves 3 or more, clustered at the middle or near the base of the stem :—

Leaves clustered near the middle of the stem, narrowed to the base :—

Robust plants attaining over 3 ft. in height; sheaths above the leaves many, erect, lanceolate; leaves elliptic-lanceolate to oblanceolate, acute or acuminate, 3—10 in. long, .7—2.5 in. wide; spike cylindric, up to 12 in. long, bracts linear-lanceolate, setaceously acuminate, as long as or longer than the ovary; sepals subequal, ovate-oblong, obtuse, petals as long, lip much longer, side lobes narrow, longer than the linear, obtuse midlobe, spur slender, incurved, usually shorter than the ovary.....21. *affinis*.
Slender or robust plants 1—2 ft. high; sheaths above the leaves few, lanceolate, acuminate; leaves elliptic-lanceolate to oblanceolate, acute or acuminate 3—9 in. long, .9—2.75 in. wide; spike elongate, up to 18 in. long, lax-flowered; bracts ovate-lanceolate, acuminate, usually shorter than the ovary; sepals subequal, lateral ovate, obtuse, petals as large, lip as long as or slightly longer than the sepals, side lobes linear-oblong, incurved, as long as or shorter than the ovate-oblong fleshy midlobe, spur slender, incurved, rather longer than the ovary, apex thickened, acute.....22. *ovalifolia*.

Leaves clustered near the base of the stem, not narrowed to the base :—

Plant 3—12 in. high, rather stout; leaves oblong or linear-oblong, obtuse or acute, 1.75—5 in. long, .4—1.1 in. wide; margins yellow, sheaths lanceolate, acuminate, margined; spike 2—6 in. long, many-flowered; bracts lanceolate, ciliolate, finely acuminate, as long as or longer than the ovary; sepals subequal, lateral oblong-lanceolate, .25 in. long, petals ovate-falcate, lip longer than the sepals, side lobes linear, slender, longer than the linear, obtuse midlobe, spur stout, as long as or shorter than the curved ovary, apex inflated.....23. *marginata*.

Plant 3—15 in. high, slender; leaves linear to linear-lanceolate, acute or acuminate, not margined, 1—4 in. long, .2—5 in. wide; sheaths small, linear, acuminate; spike slender, 2—5 in. long, dense- or lax-flowered; bracts ovate-lanceolate, acute, ciliolate, much shorter than the ovary; lateral sepals broadly oblong, .15 in. long, dorsal and broadly obliquely ovate petals shorter, lip slightly longer than the sepals, lobes slender, subequal, spur slender, as long as the ovary, slightly thickened below

24. *viridiflora*.

Leaves 2, rarely 3, radical :—

Plant 6—21 in. high; stem with many ovate-lanceolate, acuminate, imbricate or subimbricate sheaths; leaves fleshy, broadly ovate to orbicular, sometimes broader than long, rounded or acute, base cordate, 1—4.5 in. long; spike 2—12 in. long, many-flowered; bracts ovate, acuminate, as long as the ovary; sepals subequal, lateral ovate-oblong, obtuse, lip as long as the sepals, lobes linear-lanceolate, subequal or the lateral slightly shorter, spur as long as the beaked ovary.....25. *crassifolia*.

Plant 3—10 in. high; stem slender with distant, short, lanceolate, acute or acuminate sheaths; leaves appressed to the ground, orbicular, rounded or acute, base cordate, .75—2 in. in diam, the pair unequal in size; spike 1.5—4 in. long; bracts ovate, acuminate, shorter than

the ovary; sepals ovate, acute, petals linear, subfalcate, acute, as long as the lateral sepals, lip longer than the sepals, lobes filiform, lateral longer, usually spreading, spur about as long as the ovary, inflated, acute.....26. *diphylla*.

Midlobe of the lip 2-lobed, all the lobes with long filiform tails. Plant 2—21 in. high, leafy near the base; leaves oblong-lanceolate, acute, narrowed to the base, 1.5—6 in. long, .4—1.5 in. wide; spike dense-flowered, 2—4 in. long; bracts ovate-lanceolate, acuminate, about half as long as the ovary; lateral sepals obliquely ovate, dorsal and linear petals shorter, lip 3 times as long as the lateral sepals, side lobes cuneiform, midlobe flabelliform, the 2 segments semi-ovate, with a small mucro in the sinus, outer margin of all 4 segments toothed with the inner angle of each caudate, spur slender, incurved, apex clavate, longer than the beaked ovary.....27. *crinifera*.

Bracts large, foliaceous, imbricating, almost concealing the flowers. Plant 8—30 in. high, very stout; leaves imbricating, ovate or ovate-lanceolate, acute, amplexicaul, 1—3.5 in. long, .5—1 in. wide, gradually passing into the broadly ovate, cymbiform bracts; spike 3—8 in. long; bracts longer than and completely concealing the ovary and spur; sepals erect, ovate-oblong, obtuse, concave, .5—7 in. long, petals as long, linear, obtuse lip as long, coriaceous, 3-lobed, cuneately obovate, obtuse, claw geniculate, side lobes linear-oblong, obtuse, incurved, shorter than the triangular-ovate midlobe, spur subclavate, about as long as the ovary.....28. *Perrottetiana*.

1. *HABENARIA BARBATA*, Wight; F. B. I. vi. 133. *Ate virens*, Lindl.; Wt. Ic. t. 928.

W. Gháts; Venkatagiri Drug in Cuddapah.
Flowers white.

2. *HABENARIA ELWESH*, Hook. f.

Nilgiris (Proudlock); Mysore at Cadamany near Saklasapur (Barber).
Flowers white.

3. *HABENARIA ACUMINATA*, Thw.; F. B. I. vi. 133.

Anamalai Hills at 5,000 ft. and Peermade in Travancore at 4,000 ft. (Beddome).

Sepals and petals yellowish-green, lip purple, petals sometimes purple.

4. *HABENARIA MULTICAUDATA*, Sedgw.

Nilgiri Hills; Anamalai Hills in Karianshola at 2,200 ft. (Beddome, Fischer).

Flowers greenish-white, lip and spur brownish.

5. *HABENARIA DIGITATA*, Lindl.; F. B. I. vi. 134; Hook. f. Ann. Calc. v. t. 95. *H. trinervia*, Wt. Ic. t. 1701.

Hill tracts from the Godavari District and Mysore to Tinnevely, 2,000—6,000 ft.

Flowers green.

Var. *foliosa*, Hook. f.; F. B. I. vi. 135. *H. foliosa*, A. Rich.; Wt. Ic. t. 1700. Smaller; leaves shorter and broader, imbricating; raceme dense-flowered; segments of lip filiform; bracts shorter.

Nilgiri Hills at 7,000—8,000 ft.

Var. *travancorica*, Fischer. *H. travancorica*, Hook. f.; F. B. I. vi. 135. Leaves ovate-oblong; flowers much smaller; sepals pubescent within.

Pulney Hills, 4,000—7,000 ft.

Var. *Gibsoni*, Fischer. *H. Gibsoni*, Hook. f.; F. B. I. vi. 135. More robust; leaves longer and narrower; flowers much larger, fewer; no ligule in the mouth of the spur.

Mysore (Law).

6. *HABENARIA GRANDIFLORA*, Lindl.; F. B. I. vi. 136.
Bababudan (Law) and Shevaroy (Perrottet) Hills.
Flowers white.
7. *HABENARIA RARIFLORA*, A. Rich.; F. B. I. vi. 136; Wt. Ic. t. 924.
W. Ghâts, 2,000—6,000 ft.; Horsleykonda at 4,100 ft. (Fischer);
Kollimalai Hills (Barber).
Flowers white.
8. *HABENARIA CEPHALOTES*, Lindl.; F. B. I. vi. 139; Wt. Ic. t. 1711.
Nilgiri Hills at high elevations.
Flowers white.
9. *HABENARIA DENTICULATA*, Reichb. f.
Nilgiri Hills. Very rare.
10. *HABENARIA SUAVEOLENS*, Dalz.; F. B. I. vi. 140.
Bababudan Hills (Law).
Flowers white, fragrant.
11. *HABENARIA RICHARDIANA*, Wt. Ic. t. 1713; F. B. I. vi. 139.
Nilgiri and Anamalai Hills.
Flowers white.
12. *HABENARIA FIMBRIATA*, Wt. Ic. t. 1712. *H. polyodon*, Hook. f.;
F. B. I. vi. 139.
Nilgiri Hills (Wight, Gamble), 5,000—7,000 ft.
Flowers white.
13. *HABENARIA LONGICORNU*, Lindl.; F. B. I. vi. 139. *H. montana*,
A. Rich.; Wt. Ic. t. 927, fig. 1, and t. 1714, centre fig. only.
W. Ghâts from Mysore to Travancore, 3,000—6,500 ft.;
Horsleykonda at 4,100 ft. (Fischer); Kollimalai Hills (Barber).
Flowers white.
14. *HABENARIA PLATYPHYLLA*, Spreng.; F. B. I. vi. 140; Wt. Ic. t. 1709.
Orchis plantaginea, Roxb. Cor. Pl. t. 37.
In all Districts, near sea-level to 3,500 ft.
Flowers white.
15. *HABENARIA PLANTAGINEA*, Lindl.; F. B. I. vi. 141; Wt. Ic. t. 1710;
Duthie Ann. Calc. ix. t. 132.
In all Districts, 800—4,000 ft.
Flowers white.
16. *HABENARIA LONGICALCARATA*, A. Rich.; F. B. I. vi. 141; Wt. Ic.
t. 925.
Throughout the W. Ghâts; Ramandrug in the Bellary District
(A. W. Lushington).
Flowers white, spur green.
17. *HABENARIA DECIPIENS*, Wight; F. B. I. iv. 197. *H. longicalcarata*,
Hook. f. (not of A. Rich.) in part; F. B. I. vi. 141. *H. montana*,
Wt. Ic. t. 927 and t. 1714, all but the centre fig.
W. Ghâts from the Nilgiri to the Tinnevely Hills, 4,000—7,000
ft., Shevaroy Hills (Bourne).
Flowers white.

18. *HABENARIA COMMELINIFOLIA*, Wall.; F. B. I. vi. 143; Duthie Ann. Calc. ix. t. 134.
Bababudan Hills (Law).
Flowers white.
19. *HABENARIA ELLIPTICA*, Wt. Ic. t. 1706; F. B. I. vi. 147.
Pulney Hills, 7,000—8,000 ft.
Flowers greenish-white.
20. *HABENARIA HEYNEANA*, Lindl.; F. B. I. vi. 148; Wt. Ic. t. 923. *H. subpubens*, A. Rich.; F. B. I. vi. 148.
W. Gháts in grasslands, 5,500—8,000 ft.; Shevaroy Hills (Bourne).
Flowers greenish-yellow.
21. *HABENARIA AFFINIS*, Wt. Ic. t. 1707; F. B. I. vi. 149.
Nilgiri and Anamalai Hills; Rampa Hills (V. Narayanswami), 2,000—4,000 ft.
Flowers green.
22. *HABENARIA OVALIFOLIA*, Wt. Ic. t. 1708; F. B. I. vi. 149.
W. Gháts, 2,000—4,000 ft.
Flowers pale-green.
23. *HABENARIA MARGINATA*, Coleb.; F. B. I. vi. 150; Duthie Ann. Calc. ix. t. 136.
W. Gháts 1,500—3,000 ft.; Nallamalai Hills at 1,500 ft. (Fischer).
Flowers yellow.
24. *HABENARIA VIRIDIFLORA*, R. Br.; F. B. I. vi. 150; Wt. Ic. t. 1705.
Low country, often in rice-fields.
Flowers green.
25. *HABENARIA CRASSIFOLIA*, A. Rich.; F. B. I. vi. 151. *Platanthera brachyphylla*, Lindl.; Wt. Ic. t. 1694.
Nilgiri and Pulney Hills, 6,000—7,000 ft.
Flowers greenish-white, spur green.
26. *HABENARIA DIPHYLLA*, Dalz.; F. B. I. vi. 151; Duthie Ann. Calc. ix. t. 137. *H. Jerdoniana*, Wt. Ic. t. 1715.
W. Coast from Kanara to Travancore at low elevations.
Flowers greenish-white.
27. *HABENARIA CRINIFERA*, Lindl.; F. B. I. vi. 142; Wt. Ic. t. 926.
W. Gháts below 4,000 ft.
Flowers white.
28. *HABENARIA PERROTTETIANA*, A. Rich.; F. B. I. vi. 164. *Platanthera lutea*, Wt. Ic. t. 919.
W. Gháts, 5,500—7,500 ft.
Flowers yellow.

55. *Peristylus*, Blume.

Terrestrial erect, usually leafy, unbranched herbs; roots of simple or lobed tubers and fleshy, radical fibres. *Leaves* not plaited. *Flowers* usually small, in terminal spikes or racemes. *Sepals* and *petals* subequal, more or less connivent, the dorsal sepal forming a hood with the petals, the lateral sepals usually erect. *Lip* entire or 3-lobed. *Spur* usually very short, often scrotiform. *Column* very short; foot 0. *Anther* erect, 2-celled, cells parallel, adnate to the column and not

forming channels or tubes for the caudicles; pollinia 2; caudicles short; glands naked, exserted. *Stigma* sessile.

Leaves scattered or imbricate on the stem, not clustered:—

Spur equalling or longer than the sepals:—

Plant 8—24 in. high, usually rather stout; leaves lanceolate or ovate-lanceolate, acute or acuminate, 1—3 in. long, .2—75 in. wide; spike 2—10 in. long, usually dense-flowered; lateral sepals linear, obtuse, petals as long, elliptic, obtuse, lip with a concave claw, side lobes filiform, recurved over the flower, longer than the sepals and the linear or triangular obtuse midlobe, spur stout, clavate, incurved.....1. *Richardianus*.

Plant 4—20 in. high, usually slender; leaves confined to the lower half or two-thirds of the stem, reduced to small sheaths above, lanceolate or linear-lanceolate, obtuse, acute or acuminate, 1—4 in. long, .15—7 in. wide; spike narrow, 1—6 in. long, lax-flowered; lateral sepals linear, obtuse, petals triangular-ovate or oblong, obtuse, lip excavate at base, side lobes subulate, as long as or slightly longer than the sepals, spreading, longer than the broader, obtuse midlobe, spur slender, straight, not thickened below

2. *stenostachyus*.

Spur much shorter than the sepals:—

Lip 3-partite nearly to the base, side lobes filiform:—

Plant 4—12 in. high; stem with a few loose, subcucullate sheaths below; leaves ovate to lanceolate, acute or acuminate, .9—2.3 in. long, .2—6 in. wide; bracts ovate-lanceolate, as long as or longer than the flowers; lateral sepals linear, obtuse, petals as long, oblong-lanceolate, obtuse, lip to end of the midlobe as long as the sepals, side lobes filiform, much longer than the linear, obtuse midlobe, spur small, globose or ellipsoid

3. *brachyphyllus*.

Plant 6—24 in. high; stem leafy to the base or only in the upper half with loose sheaths below; leaves ovate to elliptic-lanceolate, acute or acuminate, .8—3 in. long, .3—7 in. wide; bracts lanceolate, acuminate, usually shorter than the flowers; sepals linear-lanceolate, petals as long, ovate-oblong, lip to end of midlobe shorter than the sepals, side lobes filiform, much longer than the ligulate, obtuse midlobe, spur saccate, obtuse

4. *lancifolius*.

Lip entire in the lower half, 3-cleft beyond the middle. Plant 6—18 in. high; stem leafy, often flexuous; leaves elliptic to linear-lanceolate, obtuse, acute or acuminate, 1—2.75 in. long, .2—6 in. wide; spike slender, 2—10 in. long, spirally twisted; flowers secund; bracts narrowly lanceolate, finely acuminate, equalling or exceeding the very small flowers; lateral sepals linear, obtuse, falcate, petals as long, linear or ovate-oblong, lip rather longer than broad, lobes linear, lateral acute, spreading narrower than the obtuse midlobe, spur very small, globose.....5. *spiralis*.

Leaves clustered about the middle of the stem:—

Side lobes of lip filiform. Plant 7—18 in. high, very slender; stem above the leaves naked or with very few slender short sheaths; leaves thinly membranous, 3—6, elliptic-ovate to narrowly lanceolate, acute or acuminate, narrowed into the loose sheath, 1.3—4 in. long, .4—1.1 in. wide; spike very slender, 2—6 in. long; flowers distant; bracts lanceolate, as long as or shorter than the ovaries; sepals linear, obtuse, petals as long, oblong, lip much longer than the sepals, midlobe ligulate, obtuse, spur clavate, equalling or shorter than the sepals

6. *aristatus*.

Side lobes of lip not filiform:—

Spur equalling or exceeding the sepals, clavate. Plant 6—18 in. high; stem slender, with several loose sheaths below the leaves; leaves broadly ovate or elliptic or lanceolate, obtuse, acute or acuminate, narrowed to the sheath and usually shortly petiolate, 2—6 in. long, .5—1.6 in. wide; spike narrow, twisted, 2—6 in. long; bracts ovate-lanceolate, acuminate, shorter or longer than the ovary; flowers very small; sepals oblong, obtuse, petals obliquely ovate, obtuse, lip longer than the sepals, obtusely 3-fid, lobes shallow or deep, subequal, linear-oblong.....7. *Stocksii*.

Spur shorter than the sepals, globose or subglobose:—

Plant 1—3 ft. high; stem usually very stout; leaves oblong- or elliptic-lanceolate, acute, narrowed into the broad sheath, 2·5—10 in. long, 1·25—3·25 in. wide; spike 4—12 in. long, very dense-flowered; bracts linear-lanceolate, equalling or exceeding the ovaries; sepals linear to ovate-oblong, obtuse, petals gibbously ovate, lip as long as the sepals, 3-lobed, lobes various, spur minute.....8. *goodyeroides*.

Plant 12—30 in. high; stem rather stout; leaves linear- to oblong-lanceolate, acute, base narrowed into the sheath, 4—9 in. long, 1·1—3·6 in. wide; spike narrow, 4—9 in. long, many-flowered; bracts lanceolate, acuminate, as long as or longer than the very small flowers; sepals oblong, obtuse, petals obliquely orbicular, lip shorter than the sepals, broad, entire or very shortly 3-lobed, spur very small.....9. *plantagineus*.

1. *PERISTYLUS RICHARDIANUS*, Wt. Ic. t. 1697. *Habenaria bicornuta*, Hook. f.; F. B. I. vi. 156.
Nilgiri and Pulney Hills, 5,500—7,500 ft.
Flowers greenish-white.
2. *PERISTYLUS STENOSTACHYUS*, Krzl. *Habenaria stenostachya*, Benth.; F. B. I. vi. 156. *H. peristylodes*, Wt. Ic. t. 1702.
Bababudan and Pulney Hills; High Wavy Mountains (Blatter & Hallberg).
Flowers white.
3. *PERISTYLUS BRACHYPHYLLUS*, A. Rich. *Habenaria malabarica*, Hook. f.; F. B. I. vi. 159.
Bababudan and Nilgiri Hills.
4. *PERISTYLUS LANCIFOLIUS*, A. Rich. *P. robustior*, Wt. Ic. t. 1699. *Habenaria robustior*, Hook. f.; F. B. I. vi. 160.
W. Gháts, 6,000—7,000 ft.
Flowers white or pinkish-white.
5. *PERISTYLUS SPIRALIS*, A. Rich.; Wt. Ic. t. 1696. *Habenaria torta*, Hook. f.; F. B. I. vi. 159.
Bababudan and Nilgiri Hills, 5,000—7,500 ft.; Travancore (Johnson).
Flowers greenish-white.
6. *PERISTYLUS ARISTATUS*, Lindl. *P. exilis*, Wt. Ic. t. 1698. *Habenaria aristata*, Hook. f.; F. B. I. vi. 158; King & Pantl. Ann. Calc. viii. t. 409.
W. Gháts up to 7,000 ft.
Flowers green.
7. *PERISTYLUS STOCKSI*, Krzl. *Habenaria Stocksii*, Hook. f.; F. B. I. vi. 158.
Mysore (Stocks).
Flowers yellowish.
8. *PERISTYLUS GOODYEROIDES*, Lindl. *Habenaria goodyeroides*, Don.; F. B. I. vi. 161; King & Pantl. Ann. Calc. viii. t. 430.
W. Gháts, 2,000—4,000 ft.
Flowers greenish-white.
9. *PERISTYLUS PLANTAGINEUS*, Lindl.; Wt. Ic. t. 921. *Habenaria Wightii*, Trim.; F. B. I. vi. 162. Rampa Hills (V. Narayanswami); Anamalai Hills, 2,000—2,300 ft. (Fischer); Travancore (M. Rama Rao); Malabar.
Flowers white.

56. *Platanthera*, L. C. Rich.

Terrestrial, erect, unbranched, leafy herbs; roots of ovoid-globose, rarely lobed tubers. *Leaves* not plaited. *Flowers* small or large in lax or dense terminal spikes or racemes. *Sepals* unequal, lateral spreading or reflexed, dorsal forming a hood with the narrower petals. *Lip* entire or 3-lobed, spur short or long. *Column* very short, with a warty protuberance on either side; foot 0. *Anther* erect, 2-celled, cells parallel or divergent, adnate to the sides of the rostellum, broad; pollinia 2, granular, widely separated; caudicles short or long, glands naked, exserted. *Stigmas* sessile or subsessile, more or less confluent, often pulvinate.

PLATANTERA SUSANNAE, Lindl.; Wt. Ic. t. 920. *Habenaria Susannae*, R. Br.; F. B. I. vi. 137; Duthie Ann. Calc. ix. t. 129.

Widely distributed from Ganjam to the South, 300–6,000 ft., but never common or gregarious.

A stout herb 1·5–4 ft. high; leafy up to the inflorescence; leaves ovate-oblong to oblong-lanceolate, acute or acuminate, 2–8 in. long, 1·3–2·6 in. wide, decreasing into the large leafy bracts; flowers 3–6, white, fragrant, 2–3 in. in diam.; lateral sepals obliquely subquadrately oblong, dorsal shorter, broadly rhomboid, petals linear, acute, lip as long as the lateral sepals, side lobes cuneately flabellate, deeply pectinate, midlobe linear acute or spatulate, subacute, spur slender, 3·5–5 in. long.

57. *Phyllomphax*, Schlechter.

Terrestrial, erect, unbranched, leafy herbs; roots tuberous. *Leaves* not plaited. *Flowers* medium-sized, in the axils of sheathing leaves. *Sepals* and *petals* subequal, petals entire. *Lip* broad, entire, petaloid, spur short, conical. *Column* short; foot 0; rostellum more or less 2-toothed. *Anther* erect, 2-celled; pollinia 2, granular. *Stigmas* sessile, concave.

PHYLLOMPHAX OBCORDATA, Schltr. *Habenaria galeandra*, Benth.; F. B. I. vi. 163. *Platanthera iantha*, Wt. Ic. t. 1692. *P. affinis*, Wt. Ic. t. 1693.

W. Gháts, 6,000–8,000 ft.; common in grass-lands.

Plant 5–15 in. high, very variable, slender or robust; leafy throughout, or leaves reduced to sheaths below the middle; leaves broadly ovate to lanceolate, acute, amplexicaul, 6–2·3 in. long, 2–1·1 in. wide, usually imbricating but sometimes scattered; bracts leaf-like and but little smaller; flowers white with the lip spotted with purple or the whole flower pale to deep lilac, more or less puberulous; sepals and petals erect, arching over the column, lateral sepals somewhat gibbous, lip much larger, obcordate, truncate or emarginate and with or without a terminal cusp, margins more or less crenulate.

There are 3 or 4 varieties, but they run into one another. The best defined is—

Var. *ianta*, Hook. f. (not of Wight), with much larger flowers, and the lip usually deeply emarginate without a cusp.

58. *Satyrium*, Swartz.

Terrestrial, erect, leafy, unbranched herbs; roots tuberous. *Leaves* not plaited. *Sepals* and *petals* subequal, free, spreading or deflexed. *Lip* superior, sessile at the base of the column, erect, hooded, broad, 2-spurred or -saccate behind. *Column* erect, terete; foot 0. *Anther* dorsal, cells subparallel; pollinia 2, caudicles recurved; glands large, naked. *Stigma* terminal, broad, concave, or forming with the rostellum a 2-lipped body.

SATYRIUM NEPALENSE, Don.; F. B. I. vi. 168; King & Pantl. Ann. Calc. viii. t. 444. *S. Perrottetianum*, A. Rich.; Wt. Ic. t. 1716. *S. albiflorum*, A. Rich.; Wt. Ic. t. 1717. *S. Wightianum*, Lindl.; Wt. Ic. t. 1718.

In hilly tracts from the Bababudan Hills southwards, 4,000—8,000 ft., in grassy, often marshy land.

Plant 6—30 in. high; stem usually stout, sheathed above; leaves few, very variable, lanceolate, ovate, oblong or suborbicular, acute, 2—8 in. long, .8—4.4 in. wide; spikes usually dense- and many-flowered, 1—8 in. long; bracts much larger than the flowers, oblong or lanceolate; flowers white to dark pink fragrant; lip broadly oblong, concave, strongly keeled behind, variable in size in relation to the sepals and petals, spurs variable in length and thickness, about as long as the ovary.

There are several not very well defined varieties.

59. *Disperis*, Swartz.

Small, terrestrial, unbranched herbs; roots tuberous. *Leaves* 1 or more, sessile, cordate. *Flowers* solitary or in few-flowered racemes, terminal. *Sepals* dissimilar, dorsal very narrow, cohering with the petals into a subglobose hood, lateral spreading or deflexed, free or connate at the base, often subsaccate. *Lip* adnate to the column to above the anther. *Column* short, terete below; foot 0. *Anther* oblong, completely 2-celled; pollinia 2, coarsely granular, cuneiform; caudicles rather long, usually twisted; glands large, naked. *Stigmas* on a transverse hyaline membrane, the ends of which form tubular, usually twisted processes sheathing the caudicles and glands.

Plant 2—15 in. high; stem slender or rather stout, usually flaccid, with 1 or 2 basal sheaths; leaves 1—3, ovate to suborbicular, acute, base amplexicaul, .3—1.6 in. long; flowers 1—4; bracts like the leaves, but smaller; lateral sepals oblong, united at the base, concave, each with a fovea near the base, petals demi-lunate, lip T- or Y-shaped, the vertical limb incurved with a dilated conical tip, arms falcately recurved over the anther; caudicles and their tubes twisted

1. *neilgherrensis*.

Plant 2—4 in. high; stem slender, with a single basal sheath; leaf solitary, rarely 2, rotund-cordate, subacute, amplexicaul, .3—7 in. long; flowers 1—3; bracts like the leaves, but smaller; lateral sepals spreading, broadly falcate-ovate, not concave, each with a small saccate spur near the base, petals broadly demi-lunate, lip with the midlobe 3-lobed, side lobes channelled below, strongly recurved; caudicles and their tubes not twisted.

2. *monophylla*.

1. *DISPERIS NEILGHERRENSIS*, Wt. Ic. t. 1719; F. B. I. vi. 169. *D. zeylanica*, Trim.; F. B. I. vi. 169.

W. Ghâts; 4,500—8,400 ft.

Flowers white or reddish with crimson spots.

2. DISPERIS MONOPHYLLA, Blatter in Journ. Bomb. Nat. Hist. Soc. 1928 ined.

High Wavy Mountains (Blatter & Hallberg).

Flowers greenish, white at base, veins purple.

60. *Paphiopedilum*, Pfitzer.

Terrestrial, rarely epiphytic herbs. *Leaves* coriaceous, plicate before expansion, oblong or lorate, keeled below, sulcate above. *Flowers* solitary or few, terminal, large. *Sepals* and *petals* free or lateral connate. *Lip* sessile, side lobes small, spreading or inflexed, midlobe large, saccate, inflated oblong or helmet-shaped. *Column* short, stout; foot 0. *Anthers* 2, subglobose; pollinia 2, granular. *Stigma* disciform, deflexed, concealed with the anthers beneath a large disciform staminode.

PAPHIOPEDILUM DRURYI, Pfitz. *Cypripedium Drurii*, Bedd. Ic. Pl. Ind. Or. t. 112; F. B. I. vi. 172.

Travancore Hills, 5,000—6,000 ft.

Terrestrial herb with thick succulent root-fibres; leaves radical, thickly coriaceous, ligulate, apex oblique, subacute, 7—12 in. long, about 1.5 in. wide; scape 7—12 in. long, purple-pubescent; bract sheathing, ovate acute, about one-third the length of the ovary; flower solitary, about 3 in. in diam., yellowish-green streaked and blotched with reddish-purple, warts and hairs black; dorsal sepal broadly ovate, ciliolate, arched, petals linear-oblong, warted and hirsute towards the base, lip helmet-shaped, as long as the petals.

Family CXLIX. ZINGIBERACEAE.

Perennial herbs, often very large; usually with fleshy rhizomes and thick roots. *Leaves* usually vaginate, the sheaths usually ligulate. *Flowers* moderate- to large-sized, often showy, usually zygomorphic and bracteate, trimerous. *Calyx* tubular or spathaceous, 3-lobed or -toothed, often colourless. *Corolla* funnel-shaped below, 3-lobed above, the dorsal segment usually somewhat cucullate, generally differing from and often larger than the other two. *Stamens* only one (the dorsal of the inner whorl) perfect, the other two combined in a petaliferous lip usually embracing the fertile one; the outer whorl absent or represented by 1, 2 or 3 staminodes more or less petaloid or reduced to teeth. *Anther* of fertile stamen 2-celled, introrse; connective often produced or variously appendaged. *Ovary* inferior, usually 3-, rarely 1—2- or more celled; style long and delicate, often lying in a groove in the stamen; stigma usually funnel-shaped. *Ovules* numerous. *Fruit* usually capsular but sometimes dehiscent late, or indehiscent or breaking up irregularly. *Seeds* more or less arillate, sometimes aromatic, ellipsoid or variously angled; perisperm large and mealy enclosing the endosperm. *Embryo* straight, cylindric or clavate.

Ovary 1-celled, placentas 3, parietal.....1. *Globba*.

Ovary 3-celled, placentas axile:—

Lateral staminodes large and broad:—

Connective of anther spurred at the base; spike crowned by a coma; corolla-tube funnel-shaped.....2. *Curcuma*.

Connective of anther not spurred; spike not crowned by a coma; corolla-tube long and slender:—

Stem absent or very short; filament of anther short, its connective broad and crested.....3. **Kaempferia**.

Stem tall, leafy; filament of anther long, its connective narrow and not crested.....4. **Hedychium**.

Lateral staminodes small and narrow or absent:—

Flowers in dense cone-like spikes:—

Leafy stem straight; filament of anther narrow, free from the connective, anther terminal:—

Filament of anther arcuate, its cells diverging above, connective dilated and crested or 2-lobed, not produced into a beak.....5. **Amomum**.

Filament of anther straight, its cells parallel, connective not crested, produced into a long beak.....6. **Zingiber**.

Leafy stem spirally twisted; filament of anther adnate to the connective, broad and petaloid, anther adnate to its middle.....7. **Costus**.

Flowers in lax spikes, racemes or panicles:—

Scapes leafless, arising direct from the rootstock.....8. **Elettaria**.

Inflorescence terminal on the leafy stem.....9. **Alpinia**.

1. Globba, Linn.

Erect herbs, rhizome creeping. *Leaves* oblong, oblong-lanceolate, elliptic or linear-lanceolate. *Flowers* in terminal spikes or panicles, the buds sometimes replaced by bulbils. *Calyx* funnel-shaped, 3-lobed. *Corolla*-tube slender, longer than the calyx, lobes ovate, subequal. Lateral *staminodes* petaloid, lip deflexed. *Stamen* with a long 2-appendaged filament; anther oblong, connective produced beyond the cells, simple, winged or spurred. *Ovary* 1-celled; placentas 3, parietal; style filiform, lying in the groove of the anther, stigma turbinate. *Fruit* a globose or subglobose, tardily dehiscent capsule. *Seeds* ovoid, often tomentose, aril small, white, lacerate.

Anther not winged; bracts deciduous:—

Stems 1—3 ft. high; leaves oblong or elliptic-oblong, subcaudate, glabrous, 8—10 in. long, 2—4 in. wide; panicles narrow, lowest branches 3-flowered, bulbils never present; corolla-tube about twice the length of the calyx, petals broadly ovate, longer than the staminodes, lip obovate as long as the petals, shallowly 2-lobed; ovary and capsule verrucose.....1. *orixensis*.

Stems 1—3 ft. high; leaves linear- to elliptic- or oblong-lanceolate, usually conspicuously and finely caudate, pubescent below, 5—12 in. long, 1—3 in. wide, panicles narrow, lowest branches 4—6-flowered, a few bulbils sometimes present in the lower axils; calyx, corolla and the back of the anthers covered with darker globose glands, corolla-tube thrice the length of the calyx, petals ovate, shorter than the lanceolate staminodes, lip twice the length of the corolla, very deeply bifid, segments narrow; ovary and capsule smooth.....2. *ophioglossa*.

Anther furnished with spreading bifid wings; bracts persistent; stem 1—2 ft. high; leaves oblong to elliptic-lanceolate, caudate, pubescent below, 3—10 in. long, 1—2.5 in. wide; spikes simple, the flowers in the axils of oblong, acute bracts .5—1 in. long, usually replaced by bulbils in the lower axils; calyx, corolla and the back of the anther covered with globose darker glands, corolla-tube thrice the length of the calyx, petals shorter than the oblong staminodes, lip small, deeply bifid; ovary and capsule smooth.....3. *bulbifera*.

1. GLOBBA ORIXENSIS, Roxb.; F. B. I. vi. 201; Roxb. Cor. Pl. t. 229.

Hills of the Northern Circars (Roxburgh); Mohiri Hills, Ganjam (Fischer).

Flowers orange-yellow.

2. GLOBBA OPHIOGLOSSA, Wt. Ic. t. 2002; F. B. I. vi. 202.
In damp localities from the Rampa Hills (Ramaswami, Narayanswami) to Travancore, 2,000—4,000 ft.
Flowers pale to deep-yellow.
3. GLOBBA BULBIFERA, Roxb.; F. B. I. vi. 206; *G. marantina*, Wt. Ic. t. 2001.
In all districts in damp woods, 300—4,000 ft.
Flowers yellow.

2. Curcuma, Linn.

Stemless herbs; rootstock tuberous, often with accessory stipitate tubers. *Leaves* usually oblong or broadly lanceolate, rarely narrow, often very large. *Flowers* in a dense, bracteate, strobiliform spike terminating in a coma of larger, usually coloured, sterile bracts, the fertile bracts forming pouches enclosing 2—7 bracteate flowers that develop in succession; peduncle clothed in appressed bracts. *Calyx* short, cylindric, usually minutely toothed. *Corolla* funnel-shaped, lobes 3, ovate or narrowly oblong, the upper one longer and hooded. *Lateral staminodes* petaloid, oblong, connate with the short, broad filament of the fertile stamen. *Lip* broad, entire or 2-lobed. *Anther* not crested, cells contiguous, usually spurred at the base. *Ovary* 3-celled; ovules many, axile; style filiform; stigma 2-lipped, lips ciliate. *Fruit* a tardily dehiscent, globose, 3-valved capsule. *Seeds* ovoid or oblong, usually arillate.

Flowering spike lateral, apart from and appearing usually before the leaves:—

Plant small, with the leaves rarely attaining 18 in. in height, often only 2 in. high before the leaves appear; rootstock small, white inside, root-fibres numerous, terminating in small tubers; leaves lanceolate or oblong-lanceolate, shortly petioled, 6—10 in. long, 1.5—2.5 in. wide; spike dense; fertile bracts oblong-lanceolate, acute, 1—1.5 in. long, pale yellowish-green; coma dense, pink; flowers bright yellow; lip broadly ovate or suborbicular.....1. *neilgherrensis*.
Larger plants attaining 3 ft. in height in leaf; rootstock large of large palmately branched tubers, yellow inside:—

Fleshy fibres ending in smaller tubers in addition to the large ones; leaves oblong-lanceolate, finely acuminate, 1—2 ft. long; petioles long; fertile bracts ovate, recurved, cymbiform, 1.5 in. long, green tinged with red, of the coma crimson or purple; flowers yellow; lip suborbicular, obscurely 3-lobed, .5 in. wide.....2. *Zeodaria*.

Root-fibres not ending in small tubers; leaves elliptic- or lanceolate-oblong, caudate-acuminate, 1—2 ft. long; petioles as long or longer; bracts ovate, recurved, cymbiform, obtuse, fertile pale-green, of the coma more or less tinged with red or pink; flowers pink; lip yellow, obovate, subentire or obscurely 3-lobed.....3. *aromatica*.

Flowering spike rising in the centre of a previously formed tuft of leaves:—

Rootstock small with small almond-like tubers, white inside, at the ends of fleshy fibres, no sessile tubers:—

Flowers yellow; leaves lanceolate-oblong, acuminate, tapering to the base, with the petiole reaching over 2 ft. long, 4—6 in. wide; fertile bracts obovate-lanceolate, acute, green with a pink tip, 1.25—1.75 in. long; of the coma oblong-lanceolate, lower purple-edged, upper more or less uniformly mauve-purple.....4. *pseudomontana*.

Flowers purple; leaves broadly elliptic, deltoid-acuminate, base rounded or subcordate, 6—12 in. long, 3—5 in. wide; petioles as long; fertile bracts ovate, obtuse, saccate, 1 in. long, purple; of the coma numerous, oblong, purple; lip obovate, 2-fid, margins crisped.....5. *decipiens*.

Rootstock large, tubers sessile, cylindric, yellow inside:—

Tubers aromatic:—

Tubers pale-yellow within; leafy tuft 2—3 ft. high; leaves oblong-lanceolate, tapering at both ends, up to 18 in. long and 6 in. wide; petiole as long; fertile bracts about 1 in. long, pale-green; of coma tinged with pink; flowers white or pale-yellow; lip semi-cliptic 3-lobed, midlobe emarginate

6. *Amada*.

Tubers bright-yellow within; leafy tuft 4—5 ft. high; leaves oblong, caudate-acuminate, tapering to the base, up to 18 in. long and 8 in. wide; fertile bracts about 1.5 in. long, pale-green; of the coma tinged with pink; flowers pale-yellow; lip obovate subentire.....7. *longa*.

Tubers not aromatic, pale-yellow within; leafy tuft 2—3 ft. high; leaves oblong, acute, tapering to the base, up to 12 in. long and 8 in. wide; petiole about as long; fertile bracts about 1.5 in. long, pale green; of coma pink; flowers pale-yellow; lip suborbicular, entire, slightly notched, margins undulate

8. *montana*.

1. *CURCUMA NEILGHERRENSIS*, Wt. Ic. t. 2006; F. B. I. vi. 210.
W. Gháts at high elevations.
2. *CURCUMA ZEODARIA*, Rosc.; F. B. I. vi. 210. *C. Zerumbet*, Roxb. Cor. Pl. t. 201.
Cultivated in all districts. Vern. *Tel.* Kuchur, Kichchili-gaddala; *Tam.* Kichchilik-kishangu; *Mal.* Kach-churi-kishanna.
3. *CURCUMA AROMATICA*, Salisb.; F. B. I. vi. 210; Wt. Ic. t. 2005.
Wild on the W. Coast, frequently cultivated elsewhere. The Wild Turmeric. Vern. *Tel.* Kasturi-pasupa; *Tam.* Kasturi-manjal; *Mal.* Kattu-mannar; *Kan.* Kasturi-arishina.
4. *CURCUMA PSEUDOMONTANA*, Grah. *C. montana*, Rosc.; F. B. I. vi. 214 *in part*.
Tekkadi forests of the Anamalai Hills at 2,000 ft. (Fischer).
5. *CURCUMA DECIPIENS*, Dalz.; F. B. I. vi. 215.
W. Gháts.
6. *CURCUMA AMADA*, Roxb.; F. B. I. vi. 213.
Cultivated. The Mango-ginger plant. Vern. *Tel.* Mamidiallam.
7. *CURCUMA LONGA*, Linn.; F. B. I. vi. 214.
Cultivated. The Turmeric. Vern. *Tel.* Pasupu; *Tam.* Manjal; *Mal.* Mannal, Marinalu; *Kan.* Arishina.
8. *CURCUMA MONTANA*, Rosc.; F. B. I. vi. 214 *in part*; Roxb. Cor. Pl. t. 151.
Circars (Roxb.).

3. *Kaempferia*, Linn.

Herbs, rootstock often tuberous; stems 0 or very short. *Leaves* few. *Flowers* spicate, scape radical or terminating a leafy stem. *Calyx* short, cylindric, usually splitting down one side. *Corolla*-tube long, lobes 3, equal. *Staminodes* broad, petaloid. *Stamen* short, arcuate; anther 2-celled, on a wide connective produced above into a petaloid crest, not spurred. *Lip* broad, usually 2-fid. *Ovary* 3-celled; ovules many, axile; style long, filiform; stigma turbinate. *Fruit* an oblong capsule. *Seeds* subglobose, aril small, lacerate.

Stemless; leaves 2, spread flat on the ground, orbicular to rotund-ovate, 2.5—6 in. long, 2—6 in. wide; petioles short, channelled; flowers 6—12 from between the leaves; bracts lanceolate, short; calyx as long as the outer bracts, corolla-tube 1 in. long, lobes shorter; lateral staminodes cuneate-obovate; lip longer

than the corolla-tube, obovate; deeply 2-lobed; connective of anther produced into a quadrate, 2-lobed appendage.....1. *Galanga*.
 Stemless; leaves few, erect, oblong, acuminate, up to 12 in. long and 4 in. wide, variegated green above, tinged with purple below; flowers appearing before the leaves on a short, crowded, radical spike; bracts oblong acute, outer short, inner 2—3 in. long; calyx nearly as long as the corolla-tube, minutely toothed, corolla-tube 2—3 in. long, lobes linear, nearly as long as the tube; staminodes oblong, acute, 1·5—2 in. long; lip shorter, 2-fid, segments suborbicular; crest of anther deeply 2-fid.....2. *rotunda*.

1. *KAEMPFERIA GALANGA*, Linn.; F. B. I. vi. 219; Wt. Ic. t. 899.
 W. coast at low elevations (Wight).
 Flowers fragrant; white with a purple or lilac spot on each side of the lip.
2. *KAEMPFERIA ROTUNDA*, Linn.; F. B. I. vi. 222; Wt. Ic. t. 2029.
 W. coast near Trevandrum (Wight). Often cultivated and doubtfully wild.
 Flowers fragrant; white, the lip purple or lilac.

4. *Hedychium*, Koenig.

Herbs, often very tall, rootstock tuberous; stem leafy. *Leaves* distichous, oblong or lanceolate. *Flowers* in terminal, often contracted and more or less strobiliform spikes; bracts coriaceous, 1- or more-flowered. *Calyx* tubular, more or less 3-toothed, often split down one side. *Corolla*-tube long, slender, segments equal, linear. Lateral *staminodes* petaloid. Filament of *stamen* slender; anther-cells contiguous, connective not produced or appendaged. *Lip* large, bifid. *Ovary* 3-celled; ovules many, axile; style long, filiform; stigma subglobose. *Fruit* a globose, 3-valved capsule. *Seeds* many, small, aril lacerate.

Lip broad, lobes rounded:—

- Lip* orbicular-obcordate, base suddenly narrowed. Robust plant 3—6 ft. high; leaves linear- to oblong-lanceolate, acuminate, up to 18 in. long and 4 in. wide, usually appressed-silky below, ligule large; spike usually dense-flowered, sometimes lax; bracts usually imbricate, 3—4-flowered, ovate, obtuse, usually glabrous or nearly so; calyx cylindric, shorter than the bract, glabrous, corolla-tube up to 2·5 in. long; staminodes oblong or oblanceolate; stamen shorter than the lip.....1. *coronaria*.
Lip obcordate, narrowed to the base into a distinct claw. Robust plant up to 8 ft. high; leaves lanceolate, up to 14 in. long and 3 in. wide, caudate, glabrous or pubescent along the midrib below and at the mouth of the sheath, ligule large; spike dense-flowered; bracts imbricate, 3—4-flowered, large, oblong, obtuse, more or less villous at the apex and pubescent on the back; calyx as long as or slightly longer than the bract, apex puberulous, corolla-tube up to 3 in. long; staminodes narrowly oblanceolate, often notched at the apex; stamen longer than the lip.....2. *flavescens*.
Lip narrow, deeply lobed, lobes acuminate. Robust plant up to 6 ft. high; leaves elliptic-oblong or oblong-lanceolate, up to 18 in. long and 5 in. wide, finely acuminate or caudate, silky-pubescent below; ligule short; spike long, lax-flowered; bracts 1-flowered, oblong or oblong-lanceolate, subacute, glabrous; calyx twice as long as the bract, up to 1·5 in. long, corolla-tube less than twice as long as the calyx; staminodes narrow; anther as long as or shorter than the lip.....3. *venustum*.

1. *HEDYCHIUM CORONARIUM*, Koen.; F. B. I. vi. 225; Wt. Ic. t. 2010.
 In moist localities in the hills, 2,000—5,000 ft.
 Flowers fragrant, pure-white or tinged with yellow.

2. *HEDYCHIUM FLAVESCENS*, Carey; Wt. Ic. t. 2008/9. *H. coronarium*, Koen. var. *flavescens*, Carey. F. B. I. vi. 226.
Hills of the W. Gháts; Kollimalais; Bison Hill in the Godavari District (Barber).
Flowers sulphur-yellow. Vern. Kan. Hallushulli-gidda.
- Var. *chrysoleucum*, Hook. Lip narrower; flowers white with yellow bases.
3. *HEDYCHIUM VENUSTUM*, Wt. Ic. t. 2012; F. B. I. vi. 226. *H. cernuum*, Wt. Ic. t. 2011.
W. Gháts, 3,000—5,000 ft.
Flowers white.

5. *Amomum*, Linn.

Herbs, sometimes very tall; rootstock perennial, stem leafy. *Leaves* usually oblong-lanceolate. *Spikes* usually produced directly from the rootstock, very rarely terminating the stem; bracts imbricate. *Calyx* cylindric, 3-toothed. *Corolla*-tube cylindric, usually shorter than the calyx, lobes 3, oblong or linear-oblong, the upper one often broader and more convex. *Lateral staminodes* 0 or minute. *Lip* broad or ligulate. *Stamen* with a short arcuate filament; anther-cells divaricate, sometimes hairy, often with a petaloid crest. *Ovary* 3-celled; ovules many, axile; style filiform; stigma small, subglobose or infundibuliform or large and dorsally gibbous. *Fruit* indehiscent or bursting irregularly, rarely baccate, smooth, winged or echinate, sometimes beaked. *Seeds* globose, truncate, angular or ellipsoid.

Anther not crested. Leafy stem up to 10 ft. high; leaves sessile or shortly petioled, oblong- to linear-lanceolate, acuminate, up to 3 ft. long and 7 in. wide, glabrous or minutely puberulous below, especially on the midrib; ligule linear-oblong, about 1 in. long; peduncle erect from the rootstock, up to 3 ft. long, its bracts oblong or linear oblong, up to 9 in. long, obtuse; spike globose, apex truncate; floral bracts bright red, outer up to 3 in. long, overtopping the flowers, inner shorter; fruit triangular-ovoid, smooth.....1. *involutratum*.
Anther crested:—

Spike 1—3-flowered, ellipsoid; peduncle rarely 8 in. long. Leafy stem up to 4.5 ft. high; leaves long-petioled, oblong-lanceolate or lanceolate, shortly acuminate, base attenuate, up to 20 in. long and 5 in. wide, silvery-silky below; ligule 1.3 in. long, 2-lobed; bracts about 1.2 in. long, oblong, retuse; calyx longer, lobes of corolla oblong, obtuse; lip orbicular, clawed; anther-crest sublunulate; capsule globose, smooth, about 1 in. in diam.....2. *hypoleucum*.
Spike many-flowered:—

Leaves silky-tomentose beneath. Leafy stem 4—5 ft. high; leaves lanceolate or linear-lanceolate, acuminate, base attenuate, up to 2 ft. long and 4 in. wide; petioles 1—7 in. long; ligule linear, subacute, 1—1.5 in. long; exterior bracts few, oblong, glabrous, 1—1.6 in. long; calyx hardly more than half as long, corolla lobes linear-oblong; lip obovate; anther-crest small, orbicular; ovary glabrous; capsule 9-ribbed, echinate.....3. *microstephanum*.
Leaves glabrous or nearly so beneath:—

Lip elliptic, entire, emarginate, pubescent above; anther-crest quadrate, short, crenulate. Leafy stem up to 6 ft. high; leaves lanceolate or linear-lanceolate, finely acuminate or subcaudate, base acute, up to 16 in. long, 1—3 in. wide, subsessile or very shortly petioled; spikes oblong, dense-flowered; peduncle stout with many broadly ovate bracts 6—1 in. long embracing it; outer bracts of the spike oblong-lanceolate, deep pink, about 1 in. long, margins of bracts of the spike usually villous; calyx shorter, corolla-lobes oblong or elliptic; ovary glabrous muricate; capsule globose, densely echinate, 1.2 in. in diam., chestnut coloured.....4. *cannaecarpum*.

Lip broadly obovate, deeply 3-lobed, midlobe emarginate, glabrous; anther-crest lunate, rather large, entire. Leafy stem up to 5 ft. high; leaves elliptic- or oblong-lanceolate, finely acuminate or caudate, 7—16 in. long, 1—4 in. wide, shortly petioled; spikes at first subglobose and dense-flowered; peduncles up to 6 in. long, rather slender with many loose, pink, oblong bracts 6—1 in. long embracing it, rhachis silky; bracts of the spike glabrous, floral bracts thin, tubular, 2—3-lobed; calyx slightly longer; corolla-lobes ovate; ovary glabrous, warted; capsules subtrigynous-globose, apex slightly concave and smooth, about 1 in. in diam., sides densely echinate

5. *muricatum*.

1. *AMOMUM INVOLUCRATUM*, Benth.; F. B. I. vi. 233.
Anamalai Hills at 4,000 ft. (Fischer).
Flowers ochraceous, lip striped pink.
2. *AMOMUM HYPOLEUCUM*, Thw.; F. B. I. vi. 240.
Anamalai Hills, 1,800—3,500 ft. (Beddome).
Flowers white, lip with a yellow disk, tinged with red.
3. *AMOMUM MICROSTEPHANUM*, Baker; F. B. I. vi. 239.
Kalianapandal in the Anamalai Hills at 2,300 ft. (Fischer).
Flowers white.
4. *AMOMUM CANNAECARPUM*, Benth.; F. B. I. vi. 240. *Elettaria cannaecarpa*, Wt. Ic. t. 2007.
W. Ghâts, 4,000—6,000 ft.
Flowers yellow.
5. *AMOMUM MURICATUM*, Beddome.
Anamalai Hills, 2,000—3,000 ft. (Beddome).
Flowers white to yellowish, lip yellow with a broad band of red spots, anther-crest yellow.

6. *Zingiber*, Adans.

Perennial herbs; rootstock horizontal, tuberous, usually aromatic; stem leafy. *Leaves* linear to oblong-lanceolate with stem-clasping sheaths. *Flowers* in spikes; scape radicle or terminating the leafy stem; bracts persistent, usually 1-flowered. *Calyx* cylindric, shortly 3-lobed. *Corolla*-tube cylindric; lobes lanceolate, the upper concave. Lateral *staminodes* 0 or adnate to the lip. Perfect *stamen* with a short filament; anther-cells contiguous, produced into a narrow beak as long as the loculi. *Ovary* 3-celled; ovules many, axile; style filiform; stigma small, subglobose. *Fruit* an oblong, tardily dehiscent capsule. *Seeds* large, globose, arillate.

Spikes produced direct from the rootstock, short and dense; peduncle 0 or short:—

Ligule of leaf membranous, .75 in. or more long. Leafy stem 3—5 ft. high; leaves oblong or oblong-lanceolate, acuminate, sessile, up to 16 in. long and 3.5 in. wide, more or less pubescent below; spikes oblong, dense, about 3 in. long, shortly peduncled; bracts red, exterior ones broadly ovate, interior linear-lanceolate, more or less hairy; lip 3-lobed, midlobe oblong-cuneate, 3-lobulate, margins recurved, crisped, lateral lobes short, broad.....1. *roseum*.

Ligule of leaf coriaceous, less than .5 in. long:—

Leafy stem 4—5 ft. high; leaves nearly sessile, oblong-lanceolate, acuminate, 6—12 in. long, 2—3 in. wide, pubescent beneath; spikes ovate or subglobose, practically sessile; bracts linear-oblong or lanceolate, green streaked with red, inner 2-fid; lip 3-lobed, midlobe rotund-ovate or subovate, scarcely emarginate, lateral small, rounded; capsule ellipsoid, about .8 in. long.....2. *Nimmonii*.
Leafy stem 4—6 ft. high; leaves lanceolate to oblong-lanceolate, acuminate, shortly petioled, 6—18 in. long, 1—4 in. wide, pubescent beneath; spikes

- oblong or subglobose, shortly peduncled; bracts green, outer ovate, inner lanceolate; lip 3-lobed, midlobe obovate, emarginate, lateral small, acute; capsule ellipsoid, 1 in. long.....3. *Wightianum*.
 Spikes terminating elongate peduncles sheathed by scarious bracts :—
 Leaves linear, sessile, gradually acuminate, 5–13 in. long, 4–1 in. wide, glabrous; spikes oblong-cylindric, 1.5–3 in. long, peduncles slender; sheathing scales glabrous, about 1 in. long; lip 3-lobed, midlobe oblong-obovate, lateral short, ovate, obtuse.....4. *officinale*.
 Leaves lanceolate or oblong-lanceolate, usually more than 1 in. wide :—
 Leaves glabrous beneath or nearly so, oblong-lanceolate or oblanceolate, acuminate, sessile, 6–13 in. long, 2–3 in. wide; spikes oblong, peduncle 6–18 in. long; sheathing scales long, obtuse; bracts obovate-oblong or obovate, rounded, green in flower with a pale margin dotted with dark linear glands, red in fruit; lip shorter than the corolla-lobes, 3-lobed, lobes obtuse, midlobe longest; capsules ellipsoid, 1 in. long.....5. *Zerumbet*.
 Leaves pubescent beneath :—
 Leafy stem up to 20 in. high; leaves sessile, linear-to oblong-lanceolate, acuminate, 5–12 in. long, 1–2.5 in. wide; spike cylindric 6–12 in. long, peduncle about as long; sheathing scales large, oblong; bracts obovate, acute, reddish, about 1.25 in. long; lip obovate, 3-lobed, midlobe rounded, emarginate, lateral small, obtuse; capsules obovoid, .5 in. long, pubescent, red, seeds dark-purple with a large white aril.....6. *macrostachyum*.
 Leafy stem 4–6 ft. high, root yellowish inside, aromatic, tasting of camphor; leaves subsessile, oblong-lanceolate, acute or acuminate, 6–14 in. long, 1–3 in. wide, sometimes almost hairy beneath; sheathing scales numerous, pubescent or subvillous at least above and along the edges; spikes dense, fusiform or oblong-ellipsoid, 3–6 in. long; peduncles 4–12 in. long; bracts broadly ovate, 1–1.5 in. long, subacute, bright red or greenish-red, pubescent, margins narrowly membranous; lip 3-lobed, midlobe suborbicular, deeply 2-lobed, margins crisped, lateral small, oblong, acute or obtuse; capsules subglobose, .66 in. long, seeds very many, small, purple.....7. *Casumunar*.
1. ZINGIBER ROSEUM, Rosc.; F. B. I. vi. 244. *Amomum roseum*, Roxb. Cor. Pl. t. 126.
 N. Circars (Roxburgh); Dummakonda in the Rampa Hills at 3,500 ft. (V. Narayanswami).
 Flowers bright- or pale-red, lip whitish, sometimes with reddish markings. Vern. *Tel.* Bumma-kachikai.
 2. ZINGIBER NIMMONII, Dalz.; F. B. I. vi. 244.
 Bababudan Hills (Law).
 Flowers reddish-yellow, lip yellow.
 3. ZINGIBER WIGHTIANUM, Thw.; F. B. I. vi. 244. *Z. squarrosum*, Wt. Ic. t. 2004.
 W. Gháts, 2,000–3,000 ft., Bison Hill in the Godavari District (Barber).
 Flowers pale-yellow. Vern. *Mal.* Malai-inchi.
 4. ZINGIBER OFFICINALE, Rosc.; F. B. I. vi. 246.
 Wildly cultivated. Run wild in places in the W. Gháts.
 The Ginger plant.
 Flowers greenish-yellow, lip dark purple, often spotted with yellow. The plant rarely flowers. Vern. *Hind.* Adrak; *Ur.* Adroko; *Tel.* Allamu; *Tam.* Shukku, Inchi; *Mal.* Adrakam; *Kan.* Alla.
 5. ZINGIBER ZERUMBET, Sm.; F. B. I. vi. 247.
 W. Gháts, 2,000–3,000 ft. Also widely cultivated.
 Flowers pale sulphur-yellow, lip darker. Vern. *Hind.* Mahabari, Kachur.

6. ZINGIBER MACROSTACHYUM, Dalz. ; F. B. I. vi. 247.

W. Gháts.

Flowers white or greenish-white, lip pale-yellow striped purple.

7. ZINGIBER CASUMUNAR, Roxb. ; F. B. I. vi. 248.

W. and E. Gháts. Also widely cultivated.

Flowers whitish, lip yellowish-white. Vern. *Hind.* Banada ; *Ur.* Ban-oda ; *Tel.* Karu-pasapu ; *Mal.* Kat-inchi ; *Kan.* Agalesunthi.

7. Costus, Linn.

Herbs with a tuberous, horizontal rootstock ; stem long, leafy. *Leaves* oblong ; sheaths broad. *Flowers* in dense globose or ovoid, usually terminal, spikes, rarely direct from the rootstock. *Calyx* short, funnel-shaped, teeth 3, ovate. *Corolla*-tube short or long, lobes large, oblong, subequal. Lateral *staminodes* 0 or minute. *Lip* large, obovate or orbicular, margins incurved. *Stamen* with a broad filament forming an oblong petaloid process with the connective ; anther median on the process, with 2 linear, contiguous cells. *Ovary* 3-celled, ovules many, axile ; style filiform ; stigma with a crescent-shaped depression, margin ciliate. *Fruit* a globose or ovoid, tardily-dehiscing capsule. *Seeds* ovoid or subglobose, aril short.

COSTUS SPECIOSUS, Sm. ; F. B. I. vi. 249 ; Wt. Ic. t. 2014.

In all Districts in moist localities ; near sea-level to 3,000 ft.

A succulent herb attaining 8—9 ft. in height ; stems spirally twisted so that the leaves appear spirally arranged ; leaves oblong, oblong-lanceolate or oblanceolate-oblong, acute or acuminate, often cuspidate, 5—12 in. long, 2—3 in. wide, glabrous above, silky-pubescent beneath ; flowers white in very dense spikes ; bracts ovate, .75—1.25 in. long, bright red ; lip suborbicular, 2 in. or more in diam., often with a yellow centre. Vern. *Tel.* Bomma-kachika ; *Tam.* Kottam ; *Mal.* Anakuva ; *Kan.* Changalakoshta.

8. Elettaria, Maton.

Perennial herbs ; rootstock thick, horizontal ; leafy stem tall. *Leaves* distichous. *Flowers* in elongate, flexuous panicles direct from the rootstock, shortly pedicelled ; bracts 2—7-flowered ; bracteoles membranous, tubular. *Calyx* membranous, tubular, shortly 3-lobed. *Corolla*-tube cylindric, midlobe oblong, convex, lateral narrower. Lateral *staminodes* represented by small, erect teeth. *Lip* oblong-obovate, base cuneate. *Stamen* with a short filament ; anther not crested, its cells contiguous. *Ovary* 3-celled ; ovules many, axile ; style filiform ; stigma small, funnel-shaped, ciliate. *Fruit* a subglobose, coriaceous, indehiscent capsule. *Seeds* obovoid, angular by compression, aromatic, aril 0.

ELETTARIA CARDAMOMUM, Maton ; F. B. I. vi. 251. *Alpinia Cardamomum*, Roxb. Cor. Pl. t. 226.

W. Gháts, wild and cultivated ; 2,500—4,500 ft. The Cardamom. Leafy stem 6—10 ft. high ; leaves linear-lanceolate, acuminate, sessile or very shortly petioled, glabrous above, softly pubescent beneath, 1—2 ft. long, 2—3 in. wide ; panicles several, up to

about 2 ft. long, erect or prostrate; bracts 6—7-flowered, linear-oblong, obtuse, about 1·5 in. long; calyx 5 in. long, corolla-tube white, shortly exserted, lobes 5 in. long; lip longer, white striped with violet; capsule subtrigonal, about 4 in. long, striate. Vern. *Tel.* Elaki; *Tam.* Elam, Anchi; *Mal.* Elattari; *Kan.* Elakki.

Var. *major*, Thw.; F. B. I. vi. 251. More robust; leaves broader; bracts more distant, 2—4-flowered; capsule 1 in. or more long. In the same localities.

The seeds of both used as condiments and medicinally.

9. *Alpinia*, Linn.

Perennial herbs; rootstock horizontal; leafy stem tall. *Leaves* oblong or lanceolate. *Flowers* in usually terminal spikes, racemes or panicles; bracteoles large, sometimes enveloping the bud. *Calyx* laxly tubular, shortly 3-toothed. *Corolla*-tube cylindric, usually not exceeding the calyx, lobes oblong or linear-oblong, the upper one usually broader and more convex. Lateral *staminodes* 0 or minute. *Lip* spreading, often orbicular with incurved margins, sometimes with 2 subulate processes at the base of the claw. *Stamen* with a flattened filament; anther usually without crest, cells diverging at the apex. *Ovary* 3-celled; ovules few or many in each cell, axile; style filiform; stigma subglobose. *Fruit* dry or fleshy, globose, usually indehiscent. *Seeds* globose or angular by compression, often aromatic, aril membranous.

Flowers panicled; buds not enclosed in large bracteoles :—

Ovary glabrous. Leafy stem 6—7 ft. high; leaves oblong-lanceolate, glabrous, acuminate, up to 30 in. long and 6 in. wide, very shortly petioled, ligule short, rounded, ciliate; flowers in open panicles up to 13 in. long, rhachis puberulous; lip orbicular-spathulate, apex shortly 2-lobed, claw slender with 2 subulate glands at the base; capsule about 6 in. diam., orange-red.....1. *Galanga*.

Ovary pilose :—

Leafy stem 3—6 ft. high; leaves linear- or lanceolate-oblong, acuminate, cuspidate, glabrous, 8—18 in. long, 2—4 in. wide; panicle copiously compound, 6—12 in. long, rhachis pubescent or tomentose, floral bracts small, ovate, cupular; flowers small; lip obovate-cuneate or suborbicular, emarginate, slightly over 1 in. long, claw with 2 linear-subulate glands at the base; capsule 6 in. diam., black.....2. *Allughas*.

Leafy stem 2—4 ft. high; leaves linear-lanceolate or linear, finely acuminate, 6—15 in. long, 1—2 in. wide; panicle narrow, dense-flowered, rarely more than 4 in. long, rhachis pubescent; floral bracts small, ovate; lip obovate or oblong, 1—1·5 in. long; capsule red.....3. *calcarata*.

Flowers in simple racemes; bud enclosed in large membranous bracteoles. Leafy stem 6—10 ft. high; leaves shortly petioled, narrowly oblong or oblong-lanceolate, acuminate, up to 3 ft. long and 8 in. wide, glabrous above, pubescent beneath, the margins often densely villous; raceme up to 1 ft. long, rhachis fulvous-hairy; bracts large, white, petaloid; flowers 2—2·5 in. long; lip ovate, 2 in. long; ovary densely pubescent; capsule 1 in. diam., yellow.....4. *malaccensis*.

1. *ALPINIA GALANGA*, Sw.; F. B. I. vi. 253. *Alpinia Rheedii*; Wt. Ic. t. 2026.

W. Gháts. Often cultivated.

Flowers greenish-white, lip veined with red. Vern. *Tel.* Peddampump-rashtrakam; *Tam.* Pera rattai; *Mal.* Peraratta; *Kan.* Dumpa-rasmi.

2. *ALPINIA ALLUGHAS*, Rosc. ; F. B. I. vi. 253.
W. Ghâts, up to 4,000 ft.
Flowers pink.
3. *ALPINIA CALCARATA*, Rosc. ; F. B. I. vi. 254 ; Wt. Ic. t. 2028.
W. Ghâts. Often cultivated.
Flowers white, lip variegated with red and yellow.
4. *ALPINIA MALACCENSIS*, Rosc. ; F. B. I. vi. 255.
Vizagapatam Hills (A. W. Lushington) ; 3,000—7,000 ft.
Flowers white, lip yellow, variegated with red.

Family CL. MARANTACEAE.

Perennial herbs or shrubs. *Leaves* distichous, closely parallel-penniveined, inequilateral, petioled, sheathed ; ligule usually very small, rarely conspicuous or quite absent. *Flowers* very irregular and asymmetric, in spikes or panicles ; bracts distichous ; usually 2-flowered. *Sepals* 3, free, usually equal. *Corolla* tubular below, tube usually long, 3-lobed above. *Androecium* tubular below. *Staminodes* 3—5, the outer sometimes wanting ; one of the inner 3 contracted above and furnished on one side with a hooded appendage (the *cucullum*), another broadened and often hardened (the *labellum*). Perfect stamen in the inner whorl, broad, petaloid with a 1-celled anther. *Ovary* inferior, 3-celled, or 1—2-celled by suppression ; ovules solitary in each cell. *Fruit* dry or fleshy, dehiscent or indehiscent. *Seeds* 1—3, usually arillate.

Ovary 3-celled:—

Stems tall, leafy ; flowers in dichotomously branched panicles terminal on the stem.....1. *Schumannianthus*.

Stemless herbs ; flowers in dense ellipsoid or capitate spikes arising direct from the rootstock or borne laterally on a petiole:—

Spike radical, ellipsoid ; bracts imbricate.....2. *Stachyphrynium*.

Spike capitate, lateral from a petiole ; bracts not imbricate.....3. *Phrynium*.

Ovary 1-celled.....*Maranta*.

1. *Schumannianthus*, Gagnepain.

Erect herbs or shrubs ; stems branching dichotomously. *Leaves* oblong or oblong-lanceolate ; ligule very short. *Panicle* lax-flowered, flowers in pairs ; bracts long, narrow, firm. *Sepals* ovate-lanceolate. *Staminal tube* elongate ; exterior staminodes petaloid, obovate, interior smaller. *Anther* with a petaloid appendage. *Fruit* a 3-coccous (or 2-coccous by abortion) subpyriform capsule. *Seeds* subglobose.

SCHUMANNIANTHUS VIRGATUS, Rolfe. *Clinogyne virgata*, Benth. ; F. B. I. vi. 258. *Maranta virgata*, Wall. ; Wt. Ic. t. 2015.

W. Ghâts in evergreen forests, 300—4,000 ft.

Stems 6—12 ft. high, bamboo-like ; joints knotted ; leaves acuminate, often shortly cuspidate, base rounded, 4—20 in. long, 1·5—6 in. wide, glabrous except sometimes for a band of hairs on the sheath and the 5—1 in. long petiole ; panicle effuse, up to 20 in. long and wide ; bracts narrowly oblong, 1—3·5 in. long ; flowers white, about 3 in long, pedicel about as long ; ovary villous ; capsule 3—4 in. long. Vern. *Tam. Periya-kuhai-valai*.

2. *Stachyphrynium*, K. Schumann.

Stemless herbs; rootstock usually creeping. *Leaves* broad, radical; petioles long, sheathing, simulating stems. *Flowers* in simple, subsessile or peduncled spikes direct from the rootstock. *Sepals* narrow. *Corolla*-tube usually longer than the sepals, lobes oblong or lanceolate. Outer *staminodes* petaloid, obovate, clawed; labellum truncate or shortly toothed; cucullum short, unappendaged. *Stamen* petaloid, anther-cell adnate to its margin. *Ovary* 3-celled, 1 ovule in each cell. *Capsule* 3-seeded or 2-seeded by abortion. *Seeds* smooth, aril 2-lobed, lobes linear.

STACHYPHRYNIUM SPICATUM, K. Schum. *Phrynium spicatum*, Roxb.; F. B. I. vi. 259.

Yeddicarra forests in Malabar (Beddome). Rare.

Leaves 2—4, oblong, caudate-acuminate or cuspidate, base rounded, 5—10 in. long, 1·5—3 in. wide; petiole slender, much longer than the blade, callous below the blade, pilose; flowers white, in narrow spikes 1—1·5 in. long; bracts ovate, .5—·75 in. long; staminal appendage rather large; fruit 3-seeded, seeds triquetrous, brown.

3. *Phrynium*, Willdenow.

Stemless herbs; rootstock usually creeping. *Leaves* broad, long petioled. *Flowers* in dense capitate spikes borne laterally on the petioles. *Sepals* subovate-oblong, equal. *Corolla*-tube usually slightly longer than the sepals, rarely shorter, lobes oblong. Exterior *staminodes* petaloid, obovate unequal; labellum usually very short; cucullum short, with a pendulous appendage. Perfect *stamen* with a small 1-celled anther, the filament adnate to the smaller exterior staminode. *Ovary* 3-celled. *Capsule* 3-celled and 3-seeded, or 1- or 2-seeded by abortion. Seeds subglobose.

Inner bracts of the spike broad upwards, breaking up into fibrillae at the apex. Erect herbs 2—5 ft. high; leaf single or 2, oblong or oblong-lanceolate, cuspidate, base rounded or cuneate, 4—12 in. long, 2—8 in. wide; petioles 2—3 ft. long; spike sessile on the petiole above the middle, 1·5—2 in. in diam., outer bracts 2 or 3 at the base of the spike, large rigid with an incurved scarious tip; lobes of the corolla longer than the tube, ovary silky-hairy; capsule subtruncate-trigonus, .4 in. long, chestnut.....1. *capitatum*. Inner bracts of the spike tapering to an entire, acute, hardened tip. Erect herbs 2—5 ft. high; leaf single or 2, oblong or ovate-oblong, cuspidate, base rounded or abruptly cuneate, 5—20 in. long, 3·5—8 in. wide; petiole with sheath much longer than the blade; spike sessile on the petiole well above the middle, often close to the blade, 1·5—2 in. in diam.; outer bracts at the base of the spike 5, oblong, spinulose-apiculate; lobes of the corolla shorter than the tube, ovary glabrous or apex puberulous; capsule broadly oblong .4—·5 in. long, pale.....2. *parviflorum*.

1. *PHRYNIUM CAPITATUM*, Willd.; F. B. I. vi. 258; Wt. Ic. t. 2016.

W. Ghâts at low elevations.

Flowers purple.

2. *PHRYNIUM PARVIFLORUM*, Roxb.; F. B. I. vi. 259.

Vizagapatam Hills at 3,500 ft. (A. W. Lushington); Bison Hill in the Godavari District (Barber).

Flowers white tipped with yellow.

MARANTA ARUNDINACEA, Linn., the Arrowroot, is occasionally cultivated. Vern. *Hind.* Tikhor; *Tel.* Palaguntha; *Tam.* Arurutuk-kilangu, Kuva mavu; *Kan.* Tavaksha.

Family CLI. CANNACEAE.

Erect perennial, leafy herbs. *Leaves* large, penninerved. *Flowers* in terminal spikes or panicles, asymmetric, usually brightly coloured. *Sepals* 3, free, imbricate, subequal or one smaller, herbaceous or petaloid. *Corolla* of 3 petals more or less tubular below, one always smaller. *Androecium* tubular below, partly adnate to the corolla-tube, of 1—5 members, one bearing a single anther-cell on the margin of a petaloid stamen, the staminodes petaloid, the one opposite the fertile stamen recurved (*labellum*), the others usually erect. *Ovary* inferior, 3-celled; ovules many; style flattened; stigma terminal. *Fruit* a globose or ellipsoid, 3-celled capsule.

Canna, Linn.

The only genus with the characters of the family.

CANNA ORIENTALIS, Rosc. *C. indica*, Linn., var. *orientalis*, Baker; F. B. I. vi. 260.

In most Districts but not common.

An erect herb up to 4 ft. high; flowers bright red, the labellum and style often yellow with red streaks, petals and staminodes linear or linear-lanceolate, acute; capsule globose or ellipsoid, echinate.

Canna indica, Linn., and its varieties are cultivated in gardens.

Family CLII. MUSACEAE.

Perennial herbs, shrubs or trees. *Leaves* distichous or spirally arranged, blade large or gigantic; petiole above the sheath large. *Flowers* in simple or paniced spikes, zygomorphic, usually hermaphrodite but sometimes monoecious, sessile or shortly, rarely long, petioled; bracts sometimes brightly coloured. Outer and inner *perianth* usually both petaloid, free or variously united. Fertile *stamens* 5, rarely 6, free, the 6th usually converted into a staminode; anthers linear, 2-celled. *Ovary* inferior, 3-celled; ovules 1-several in each cell, basal or axile; style simple; stigma simple or 3—6-lobed. *Fruit* baccate or capsular. *Seeds* hard, sometimes arillate.

Musa, Linn.

Erect herbs, shrubs or trees, the stems composed of convolute leaf-sheaths. *Leaves* spirally arranged, very large, oblong. *Flowers* monoecious, on stout, elongate, bracteate spikes, ♂ above, ♀ below; bracts spirally arranged, large, ovate or orbicular. *Sepals* and 2 *petals* usually connate into a 3—5-lobed tube split down one side, remaining petal opposite the split, free, as long as the calyx, embracing the base

of the stamens and style. *Stamens* 5 (rarely 6) perfect, 6th usually rudimentary or absent; filaments erect, stoutly filiform; anthers erect. *Ovary* many-ovuled; style filiform; stigma subglobose, 3–6-lobed. *Fruit* baccate, large, oblong. *Seeds* subglobose or angled by compression, embedded in pulp.

Plant 10–12 ft. high, stem 7–8 ft. in circumference at the base and narrowed to 3 ft. below the leaves, not stoloniferous, dying after flowering; leaves oblong, narrowed to the base, 5–10 ft. long, 2–3 ft. wide, petiole short; spikes ultimately drooping, up to 4 ft. long; bracts very many, orbicular, up to 1 ft. long, dull claret-brown, many-flowered; flowers in 2 dense rows; fruit oblong, 3 in. long, several in a cluster, edible but insipid; seeds subglobose or angled by compression, black or brown. 1. *superba*.
Plant 3–5 ft. high, 3–4 in. diam., stoloniferous, root perennial; leaves linear-oblong, up to 4.5 ft. long and 1 ft. wide, petiole 1–2 ft. long; spikes erect or somewhat bent over, up to 18 in. long; bracts few, lanceolate- to ovate-oblong, 3–6 in. long, bright lilac or pink, 3–4-flowered, the lowest 4 or 5 only fertile; fruit linear-oblong, 4–5 angled, 2–4 in a cluster, 3–4 in. long, inedible; seeds black, tuberculate. 2. *rosacea*.

1. *MUSA SUPERBA*, Roxb. Cor. Pl. t. 223; F. B. I. vi. 261; Wt. Ic. t. 2017.

W. Gháts, on rocky hill-sides, 1,000–5,000 ft.

The Wild Plantain.

2. *MUSA ROSACEA*, Jacq.; F. B. I. vi. 263.

Rampa Hills (Gamble).

MUSA PARADISIACA, Linn. *M. sapientum*, Linn.; F. B. I. vi. 262; Roxb. Cor. Pl. t. 275. The Plantain or Banana Tree; is extensively cultivated. *Musa textilis*, L. Née, Manilla Hemp, is occasionally cultivated for its fibre.

Ravenala madagascarensis, Sonn. The Traveller's Tree, with large plantain-like leaves forming a fan-like head, is grown ornamentally in gardens.

FAMILY CLIII. BROMELIACEAE.

Herbs, rarely shrubby or arboreous, often epiphytic. *Leaves* usually in clustered, radical, spirally arranged rosettes, base amplexicaul and sheathing. *Flowers* 2-sexual, usually from the centre of the rosette, terminal, sessile in heads, spikes, racemes or panicles; often with brilliantly coloured bracts below the flowers which pass into the floral bracts and sometimes with a terminal crown of foliage leaves above. *Sepals* 3, free or connate, herbaceous or coriaceous. *Petals* 3, free or half or wholly connate into a tube, often with 2 scales at the base within. *Stamens* 6, all free or connate or one whorl free and one whorl connate; anthers introrse. *Ovary* inferior, half inferior or superior, 3-celled; ovules usually many in each cell; style with 3 stigmas or stigmatic branches. *Fruit* baccate, sometimes combined into a syncarp, sometimes dehiscent. *Embryo* small, in a small pocket or fork of the mealy albumen.

There are no indigenous genera of this family but *Ananas sativus*, Schult., the Pine Apple, is cultivated in some localities. Vern. Tel. Anasa-pandu; Tam. Anashap-pazham; Mal. Annanas; Kan. Ananasuhannu.

Family CLIV. HAEMODORACEAE.

Perennial herbs; rootstock short, tuberous. *Leaves* usually radical, distichous, narrow. *Flowers* 2-sexual, regular, in terminal spikes, racemes or panicles. *Perianth* petaloid, 2-seriate, lobes 6, free or more or less connate, imbricate or induplicate-valvate. *Stamens* 6 and opposite to the perianth-lobes or more or less adnate to them or fewer; anthers erect or versatile, 2-celled, opening by a slit, rarely by a pore. *Ovary* inferior, subinferior or superior, 3-celled, sometimes imperfectly so; ovules 1—several in the angle of each cell; style filiform, rarely short or wanting; stigma simple or notched. *Fruit* a superior or nearly superior capsule or an inferior berry. *Seeds* various; embryo small, partially enclosed in the fleshy albumen.

Filaments united into a ring closing the mouth of the perianth.....1. **Peliosanthes.**
 Filaments free, short.....2. **Ophiopogon.**

1. **Peliosanthes**, Andr.

Rootstock horizontal. *Leaves* radical, linear or lanceolate, subplicate nerved. *Scape* erect; bracts scarious. *Flowers* small, racemed. *Perianth* broadly campanulate, tube short, lobes spreading. *Stamens* 6; filaments very short; anthers sub-sessile. *Ovary* inferior, the top free, conical, 3-celled; ovules 2 or more in each cell; stigma subsessile, 3-lobed. *Fruit* a berry. *Seeds* few, bursting through the pericarp during ripening and resting on the base of the withered perianth; embryo in the base of the hard fleshy albumen.

Leaves narrowly elliptic-lanceolate or oblanceolate, acuminate, base tapering, glabrous, pale when dry 4—9 in. long, .6—1.6 in. wide; petiole slender, 2.5—12 in. long, pale when dry; raceme slender, rarely as long as the leaves and petioles; bracts ovate, .1—2.5 in. long; flowers numerous, about .2 in. in diam.; berry subglobose, about .3 in. long.....1. *neilgherrensis*.
Leaves lanceolate or oblanceolate, acute or acuminate, base tapering, glabrous, dark when dry, 7—14 in. long, 1—5.3 in. wide; petiole rather stout, 9—20 in. long, dark when dry; raceme moderately slender, usually as long as the petioles; bracts ovate- or linear-lanceolate, .2—5 in. long; flowers numerous, about .25 in. in diam.; berry subglobose, about .5 in. long.....2. *courtallensis*.

1. **PELIOSANTHES NEILGHERRENSIS**, Wt. Ic. t. 2052; F. B. I. vi. 266.

W. Gháts, from the Nilgiri Hills southwards, in dense evergreen forests, 2,000—6,500 ft.

Flowers greenish- to dark-purple; berries blue.

2. **PELIOSANTHES COURTALLENIS**, Wt. Ic. t. 2051; F. B. I. vi. 266.

In the same situations as the last species.

Flowers blue-purple (Jerdon). Very similar to the last species and doubtfully separable though more robust.

2. **Ophiopogon**, Ker-Gawl.

Small, scapigerous herbs; stem short from a short rootstock or elongate and subscandent. *Leaves* radical, linear or lanceolate. *Scape* leafy or naked; bracts scarious. *Flowers* racemed, usually many-flowered. *Perianth* segments spreading. *Stamens* 6, on the bases of the perianth-segments; filaments erect; anthers basifixed. *Ovary* inferior,

3-celled, crown flat or depressed; ovules 2 in each cell, collateral, erect; style columnar; stigma 3-toothed. *Fruit* indehiscent. *Seeds* few, testa fleshy or succulent, like those of *Peliosanthes*.

OPHIPOGON INTERMEDIUS, Don; F. B. I. vi. 269. *O. indicus*, Wt. Ic. t. 2050.

W. Gháts, 3,500—7,300 ft.; Sirumalais and Kollimalais (Jacob); Mahendragiri Hill in the Ganjam District at 4,500 ft. (Fischer and Gage); Vizagapatam District at Endrika, 3,000 ft. (A. W. Lushington).

Leaves narrowly linear, obtuse, acute or acuminate, tapering to the base, 4—24 in. long, 1—5 in. wide; flowers white, about 3 in. diam.; seeds subglobose.

Var. *pauciflorus*, Hook. f.; F. B. I. vi. 269, with 5 or fewer flowers in the raceme.

Var. *gracilipes*, Hook. f.; F. B. I. vi. 269, with very narrow leaves tapering to an almost filamentous base.

Family CLV. AMARYLLIDACEAE.

Perennial herbs, sometimes large, woody shrubs; rootstock a bulb, corm or tuber, rarely an erect stock. *Leaves* radical or clustered at the apex of a more or less well-developed caudex. *Scape* naked (in the Indian genera) or bracteate. *Flowers* few (in the Indian genera) and umbelled, rarely solitary or many and paniced, usually 2-sexual, regular or somewhat zygomorphic, often showy; bracts membranous or coloured, seldom herbaceous (in Indian genera), the outer 1—3 forming an involucre under the umbel. *Perianth* superior, tube 0, short or long, limb 6-lobed or -partite, sometimes with a corona at the mouth. *Stamens* 6, on the base of the perianth segments, rarely epigynous; filaments free or connate by the corona; anthers erect or versatile. *Ovary* inferior, 3-celled; ovules many, 2-seriate in the inner angles of the cells: style stout or slender; stigma simple or 3-cleft. *Fruit* usually loculicidally capsular, sometimes fleshy. *Seeds* few or many; albumen fleshy, enclosing the small embryo.

Leaves all radical from the rootstock, never on a well-developed caudex; flowers not paniced:—

Leaves rigid and usually plicate; scape short, sometimes subterranean; flowers rather small, usually yellow:—

Ovary not or hardly produced upwards into a rostrum:—

Leaves sessile, narrowly linear, not plicate; fruit circumscrib near the apex
1. *Hypoxis*.

Leaves petioled, lanceolate or linear-lanceolate, rarely linear, more or less plicate; fruit indehiscent.....2. *Molineria*.

Ovary produced upwards into a filamentous rostrum.....3. *Curculigo*.

Leaves flat, usually succulent, never plicate; scape usually stout and elongate with 1—3 membranous involucral bracts at the apex; flowers in umbels, rarely solitary, usually showy, not yellow:—

Stamens not united by a membranous corona:—

Flower solitary.....*Zephyranthes*.

Flowers 2 or more.....4. *Crinum*.

Stamens united by a membranous corona.....5. *Pancratium*.

Leaves clustered at the top of a more or less well-developed caudex; flowers panicked on a gigantic, woody scape:—

Perianth shortly tubular below; stamens exserted; style filiform..... **Agave.**
 Perianth divided to the base; stamens included; filaments and style swollen at the base or below the middle..... **Furcraea.**

1. *Hypoxis*, Linn.

Small herbs; rootstock tuberos or a coated corm. *Leaves* sessile, strongly nerved. *Flowers* solitary, racemed or umbelled. *Perianth* rotate, 6-partite, persistent. *Stamens* 6; filaments erect; anthers erect, dorsifixed. *Ovary* 3-celled; style short, columnar; stigmas 3, erect, stout, distinct or connate. *Capsule* circumsciss below the apex or 3-valved. *Seeds* subglobose, testa crustaceous, shining, beaked at the hilum.

HYPOXIS AUREA, Lour.; F. B. I. vi. 277.

Anamalai Hills at 3,000—4,000 ft. (Beddome); Pulney Hills at Kodaikanal (Bourne).

3—15 in. high; rootstock subglobose or elongate and erect, crowned with the fibrous remains of the old leaves; leaves sheathing below, acute, 4—14 in. long, 1—25 in. wide, pilose or glabrescent; scapes 1—4, filiform, 1—4 in. long, 1—2-flowered, glabrous or more or less pilose; flowers 3—5 in. long; the ovary quite evident below the acute, yellow perianth-lobes, ovary and perianth pilose without; capsule cylindric-turbinate, crowned by the enlarged perianth, circumsciss.

2. *Molineria*, Callo.

Perennial herbs; rootstock tuberos. *Leaves* petioled, lanceolate, plicate. *Flowers* sometimes polygamous, racemed or sometimes aggregated in dense capitula. *Perianth* sessile or almost so on the inferior ovary, segments oblong. *Stamens* 6; filaments erect; anthers basifixed. *Ovary* 3-celled; ovules many in each cell; style subulate; stigma capitate, oblong-trigonus. *Fruit* a berry crowned by the enlarged, persistent perianth. *Seeds* globose, black, opaque.

MOLINERIA FINLAYSONIANA, Baker. *Curculigo Finlaysoniana*, Wall.; F. B. I. vi. 279. *Hypoxis latifolia*, Wt. Ic. t. 2044. *H. trichocarpa* and *H. leptostachya*, Wt. Ic. t. 2045. *H. pauciflora* and *H. brachystachya*, Wt. Ic. t. 2046.

W. Ghâts, 400—6,000 ft.; Mahendragiri Hills in the Ganjam District at 4,500 ft. (Fischer and Gage).

Tuber elongate, oblong-cylindric; root-fibres numerous, elongate; leaves lanceolate, acute to finely acuminate, base tapering, 5—20 in. long, .5—2 in. wide, pilose or glabrescent; petiole slender, widened at the base, 2.5—13 in. long, sometimes very short; flowers usually numerous in bracteate racemes, yellow, often the upper ♂ without or with a more or less developed style, perianth-lobes obtuse; filaments filiform; anthers deeply linear-hastate; rachis of scape linear-lanceolate bracts and ovary fulvous-pilose; berry cylindric or fusiform.

3. *Curculigo*, Gaertn.

Stemless herb; rootstock more or less tuberous, sub-oblong, thick, crowned with the remains of old leaves. *Leaves* radical, narrow, more or less pilose, sessile or petioled, prominently nerved and plicate. *Flowers* solitary or racemed on usually a very short scape among the leaves and often subterranean. *Perianth* superior, 6-partite of the base. *Stamens* 6, on the base of the perianth segments; filaments filiform; anthers linear or lanceolate, base sagittate, basifixed. *Ovary* inferior, hidden among the leaves, often subterranean, 3-celled, always produced upwards into a filiform rostrum which pushes the perianth above ground; ovules 12—24 in each cell; style columnar-filiform; stigmas 3, free or connate. *Fruit* indehiscent, more or less succulent. *Seeds* subglobose; testa black, shining, striate, beaked at the hilum.

CURCULIGO ORCHOIDES, Gaertn.; F. B. I. vi. 279; Roxb. Cor. Pl. t. 13; *C. malabarica* and *C. brevifolia*, Wt. Ic. t. 2043.

In all Districts, near sea-level up to 7,500 ft.

Rootstock elongate, up to 1 ft. long; leaves very variable, narrowly linear to lanceolate, acute, sessile or tapering into a short or long petiole, glabrous or more or less whitish pilose, 1·5—21 in. long, 2—1·5 in. wide, often viviparous at the tips; scape usually very short and hidden among the bases of the leaves underground, only the perianths rising not far above ground and appearing solitary; perianth about 5 in. long, more or less pilose; ovary usually below ground; produced into a filamentous pilose rostrum 5—1·6 in. long; fruit subulate to ovate, 5—1 in. long; seeds few to many. Vern. *Tel.* Nalla-tadi.

4. *Crinum*, Linn.

Stout herbs; rootstock bulbous. *Leaves* fleshy, elongate, lorate or ensiform. *Scape* solid. *Flowers* large, in umbels subtended by 2 spathaceous bracts, bracteoles linear. *Perianth* funnel- or salver-shaped, tube long, straight or upcurved, lobes 6, linear to oblong. *Stamens* 6, on the throat of the perianth; filaments free, filiform, erect, spreading or declinate; anthers linear, dorsifixed, versatile. *Ovary* 3-celled; ovules few or many in each cell; style filiform; stigma minute. *Fruit* large, subglobose, breaking up irregularly. *Seeds* few, large, testa thick; albumen copious.

Perianth salver-shaped, erect, lobes linear:—

Bulb 2—4 in. in diam., narrowed into a neck 4—12 in. long; leaves linear-lanceolate, shortly acuminate, 20—30 in. long, 5—7 in. wide, margins smooth; scape 1·5—3 ft. long, up to 1 in. in diam. at the base, 15—50-flowered; bracts 3—4 in. long; pedicels 2—1 in. long; perianth-tube 3—4 in. long, slender, lobes about 2 in. long; filaments shorter than the perianth-lobes; fruit 1—2 in. in diam.1. *asiaticum*.
Bulb ovoid, 2—3 in. in diam., neck 2—6 in. long; leaves linear, deeply channelled, obtuse, 2—3 ft. long, 75—2 in. wide, margins smooth; scapes from the outer leaf-axils, 1—2·5 ft. long, 6—12-flowered; bracts 1·5—3 in. long; pedicels very short; perianth-tube 2·5—4 in. long, slender, lobes 3—4 in. long; filaments rather shorter than the perianth-lobes; fruit 1—1·5 in. in diam.2. *defixum*.
Perianth funnel-shaped, drooping, lobes lanceolate or oblanceolate, 3—4 in. long, 75—1 in. wide, appendaged at the cuspidate apex. Bulb subglobose, 5—6 in. in diam., neck stout; leaves lorate, thin, 2—4 ft. long, 3—5 in. wide, margins slightly

scabrid; scape 2—3 ft. long, stout, 8—20-flowered; bracts 3—4 in. long; pedicels very short; perianth-tube 3—6 in. long; filaments much shorter than the perianth-lobes; fruit 1·5—2·5 in. in diam.....3. *latifolium*.

1. CRINUM ASIATICUM, Linn.; F. B. I. vi. 280. *C. toxicarium*, Roxb.; Wt. Ic. t. 2021—22.

In all Districts, up to 4,000 ft. Often cultivated.

Flowers white, stamens reddish.

2. CRINUM DEFIXUM, Ker; F. B. I. vi. 281.

In all districts; along streams and backwaters, up to 3,000 ft.

Flowers white, stamens bright red.

var. *ensifolium*, Baker; *C. ensifolium*, Roxb.; F. B. I. vi. 281.

Leaves ensiform, gradually acuminate.

3. CRINUM LATIFOLIUM, Linn.; F. B. I. vi. 283; Wt. Ic. t. 2019-20.

In all Districts, up to 6,000 ft.

Flowers white tinged with rose or purple.

5. *Pancratium*, Linn.

Herbs; rootstock a coated bulb. *Leaves* linear or lanceolate, often bifarious. *Flowers* large, solitary or umbelled on a solid scape, sessile or pedicelled, subtended by 1—4 membranous spathes; bracts linear, hyaline. *Perianth* funnel-shaped, tube short or long, lobes 6, narrow. *Stamens* 6, on the throat of the perianth; filaments filiform, united below by a coronal membrane into a toothed or lobed cup; anthers oblong or linear, dorsifixed, versatile. *Ovary* 3-celled; ovules many and 2-seriate in each cell; style filiform; stigma small, capitate. *Capsule* large, subglobose, triangular, loculicidal. *Seeds* many, angled; testa lax, black.

Scapes 2- or more-flowered:—

Filaments much longer than the teeth of the staminal-cup and the anthers. Bulb globose 1·5—2 in. in diam., neck short, long or 0; leaves thin, linear or linear-lanceolate; umbel 2—8-flowered; spathes 2; pedicels short; perianth-tube 1·5—3 in. long, lobes linear, 75—1 in. long; staminal cup with bifid teeth between the filaments.....1. *triflorum*.

Filaments hardly longer than the teeth of the staminal-cup, shorter than the anthers. Bulb globose, neck usually long, cylindric; leaves thin, linear or linear-lanceolate, narrowed towards the base; scape slender, 2—4-flowered; spathe single, sometimes deeply bifid; perianth-tube 2—4 in. long, lobes linear, 1 in. long; staminal-cup as long as the lobes, 12-toothed.....2. *parvum*.

Scape 1- (rarely 2-) flowered. Bulb globose, 1·5—2 in. in diam.; leaves narrowly lanceolate; scape shorter than the leaves; spathe single; perianth-tube 2—6 in. long, slender, lobes linear-lanceolate, 2 in. long; staminal-cup 1 in. long, 2-toothed between the filaments.....3. *longiflorum*.

1. PANCRATIUM TRIFLORUM, Roxb.; F. B. I. vi. 285. *P. verecundum*, Wt. Ic. t. 2023; F. B. I. vi. 286.

In all Districts, up to 2,000 ft.

Flowers pure white, fragrant.

2. PANCRATIUM PARVUM, Dalz.; F. B. I. vi. 286.

Bababudan Hills (Law).

Flowers white.

3. PANCRATIUM LONGIFLORUM, Roxb.; F. B. I. vi. 286.

Vizagapatam District (Barber).

Perianth-tube pale-green, lobes white.

Zephyranthes carinata, Herbert, The Pink Lily, is an escape from gardens in the Hills, and *Z. tubispatha*, Herbert; F. B. I. vi. 277, a similar escape in the plains.

The following have been planted for fibre or as hedge or ornamental plants: *Agave americana*, Linn.; F. B. I. vi. 277, *A. Vera-Cruz*, Mill., *A. Cantala*, Roxb., *A. sisalana*, Perr. (Sisal Hemp), *A. Wightii*, Drum. & Prain; Wt Ic. t. 2024 under *A. vivipara*, and *A. sp. ?*; also *Furcraea gigantea*, Vent., and another species. (For an account of these 2 genera as represented in India see 'Notes on Agave and Furcraea in India,' J. R. Drummond and D. Prain, Bengal Agric. Series, Bull. 8, 1905.)

Family CLVI. TACCACEAE.

Perennial herbs; rootstock tuberous or creeping. *Leaves* radical, entire and costate or pinnately lobed or laciniate and penninerved. *Flowers* 2-sexual, regular, umbelled on a naked scape with an involucre of 2—12 spathaceous bracts and long, filiform bracteoles. *Perianth* superior, urceolate or subcampanulate, 6-lobed in 2 series. *Stamens* 6, included, on the tube or the base of the perianth-lobes; filaments very short, dilated or laterally appendaged at the base, dilated into a hood above the anthers with 2 ribs or horns on the inner face; anthers sessile within the hood. *Ovary* inferior, 1-celled; ovules many on 3 parietal placentas; style short, included; stigmas 3, often petaloid, broad and 2-lobed, reflexed like an umbrella over the style. *Fruit* baccate, or at length 3-valved, 3—6-ribbed. *Seeds* numerous, ovoid, striate; albumen hard; embryo minute.

Tacca, Forst.

Characters of the Family, fruit a berry.

TACCA PINNATIFIDA, Forst.; F. B. I. vi. 287.

Goomsur in Ganjam; Rampa Hill (Ramaswami); Bison Hill in the Godavari District (Barber) Nallamalais; Mysore at Ananthapura (Meebold). Sometimes cultivated.

Rootstock globose, up to 1 ft. in diam.; leaves circular in outline, 1—3 ft. in diam., 3-partite, the segments variously and unequally pinnate; petioles 1—3 ft. long; scape longer than the petioles, terete, hollow, striate; flowers 10—40, pedicelled, drooping; bracts 6—12, oblong-lanceolate, acuminate, about 1 in. long, greenish striped with purple; bracteoles 3—5 in. long; perianth fleshy, subglobose, 6—7 in. in diam., greenish, lobes margined with purple; berry subglobose, about 1 in. long, 6-ribbed, yellow.

Family CLVII. DIOSCOREACEAE.

Climbing, rarely erect, herbs or shrubs; rootstock tuberous or with a hard rhizome and tuberous roots. *Leaves* opposite or alternate (sometimes both on the same plant), simple, lobed or digitately 3—9-foliate, palmiribbed and reticulately veined; petioles often angular and twisted at the base. *Flowers* regular, small or minute, usually monoecious or dioecious, rarely hermaphrodite, in spikes, racemes or panicles. *Perianth*

tubular, urceolate or rotate, 6-cleft, often shortly connate below. *Stamens* of ♂ 3 or 6, or 3 perfect with 3 alternating staminodes, inserted at the base of the perianth or on its lobes; anthers small. *Pistillode* sometimes present. *Staminodes* of ♀ 6, 3 or 0. *Ovary* inferior, 3-quetrous, usually 3-celled; ovules 2 superposed in each cell; styles 3, short; stigmas entire or 2-fid, recurved. *Fruit* a berry or a 3-valved capsule. *Seeds* flat or subglobose, winged or not; embryo small, included in the usually hard albumen.

Climbing plants; flowers 1-sexual; fruit a 3-winged capsule.....1. **Dioscorea.**
 Erect plants; flowers 2-sexual; fruit an unwinged berry.....2. **Trichopus.**

1. *Dioscorea*, Linn.

Climbing herbs. *Flowers* 1-sexual, rarely abnormally 2-sexual. ♂ *perianth* with 6 short lobes. *Stamens* 6 or 3 alternating with staminodes. *Pistillode* thick and fleshy or 0. ♀ *perianth* with 6 free small segments. *Staminodes* 6, 3 or 0. *Ovary* inferior, 3-quetrous, 3-celled; styles 3, short. *Fruit* a loculicidal, flattened, 3-winged capsule. *Seeds* always 2 in each cell, compressed, with a large membranous wing; albumen compressed, fleshy or hard, 2-laminate; embryo between the blades; cotyledons suborbicular.

(The following key and most of the information on the species of *Dioscorea* have been generously supplied by Mr. J. H. Burkill, F.L.S.; they have appeared in part in the 'Journ. As. Soc. Beng.' N.S. x (1914), 6.)

Stems twining to the left; capsules reflexed upwards:—

Leaves simple:—

Tubers numerous, edible, stalked, protected by root-fibres generally bearing spines up to .5 in. long; stem prickly; leaves orbicular or reniform, acuminate or cuspidate, base cordate, 2—5 in. long; petioles about as long; ♂ spikes 6—18 in. long; flowers erect, with a disk within the 6 perfect stamens; capsule oblong, slightly narrowed below, apex retuse; seeds broadly winged all round.....1. *esculenta*.
 Tubers single or at most 2—3, without defined stalk, inedible or very inferior as food, root-fibres not spinous; stem unarmed, bearing warted bulbils in the leaf-axils; leaves broadly ovate to suborbicular, acuminate, cuspidate or caudate, base cordate, 2—8 in. long; petioles usually somewhat shorter; ♂ spikes very slender, 1—4 in. long, close or scattered on long, pendulous, axillary panicles; flowers pendulous without disk within the 6 perfect stamens; capsule quadrately oblong, slightly widened upwards, .6—1 in. long; seeds winged at the base only.....2. *bulbifera*.

Leaves compound, upper sometimes simple; seeds winged at the base only:—

Fertile stamens 6. Root tuberous, lobed; stems more or less prickly; leaves 3-foliate; petiole 2—9 in. long, sometimes prickly, glabrous or finely pubescent; leaflets broadly cuneate-obovate, cuspidately caudate-acuminate, base tapering, the lateral very oblique, sometimes shortly 2-lobed, sometimes gibbous and broader than long, 3—13 in. long, 1.7—6 in. wide, glabrous or finely pubescent below; petiolules .1—75 in. long; ♂ flowers in dense cylindric spikes clustered along a more or less prickly long, pubescent or villous rhachis, ♀ in solitary, distant spikes; capsule quadrately oblong, ends truncately rounded, smooth, 2 in. long, 1 in. wide.....3. *hispida*.

Fertile stamens 3, staminodes 3:—

Many of the upper leaves simple, white tomentose. Tubers elongate; stems slender, often prickly towards the base, tomentose above; leaves mostly 3-foliate, occasionally 5—6-foliate below; petioles 1.5—5.5 in. long; leaflets variable, terminal elliptic or obovate, lateral often very gibbous, all acuminate,

cuspidate or rounded, base acute, the simple leaves ovate- or orbicular-cordate, 1·5–7 in. long 1–4 in. wide; all densely white-tomentose below; ♂ spikes short, 1–3 together on a slender tomentose panicle, ♀ in simple or branched racemes up to 1 ft. long; capsules cuneately oblong, up to 1·1 in. long, downy, eventually glabrescent.....4. *tomentosa*.

Rarely a few of the uppermost leaves simple, rusty-hairy:—

Leaflets 3–5. Tubers oblong or very diverse in different varieties; stem slender, prickly towards the base, glabrous, often bearing axillary bulbils; petioles 2–5 in. long; the simple leaves orbicular or rotund-ovate, cuspidate; leaflets elliptic, lanceolate, ovate or obovate, abruptly cuspidate, base attenuate, lateral often gibbous, glabrous or rusty-pubescent below, 2·5–7 in. long, 1–4 in. wide; ♂ flowers in small racemes on long, slender axillary or terminal panicles, ♀ in slender, elongate, 1–3-nate racemes; capsules oblong, glabrous, up to 1 in. long.....5. *pentaphylla*.

Leaflets 5–7, rarely 3 near the tips, coarse. Tuber single, stem slender, sparsely prickly, hirsute, at length glabrescent; petioles up to 10 in. long; leaflets obovate or elliptic, acuminate, base acute, lateral asymmetric, smaller and wider in proportion, up to 10 in. long and 4 in. wide, pubescent below; ♂ flowers in 1–2-nate spikes on long racemes, spikes long, rusty-tomentose.....6. *Kalkapershadii*.

Stems twining to the right; leaves simple; capsules facing forwards; seeds broadly winged all round:—

Stems glabrous:—

Stems neither winged nor conspicuously angled; axis of the ♂ spikes not zig-zag:—

Leaves coriaceous, elliptic, oblong or ovate, acuminate or cuspidate, base cuneate or rounded, 2–6 in. long, .75–2·75 in. wide; petioles .75–1·75 in. long; spikes simple, solitary or twin, slender; capsules subquadrate or rather broader than long, apex and base retuse, 1·5–2·2 in. wide

7. *spicata*.

Leaves not coriaceous:—

Veins of leaves not prominent, though usually distinct:—

Bases of leaves acute or rounded, very rarely cordate. Tubers deep underground; stem slender, unarmed, not bulbiferous; leaves lanceolate to elliptic-oblong, ovate or suborbicular, acuminate or obtuse, with a well-defined cartilaginous margin, 2–5 in. long, .5–3·5 in. wide; petioles .6–1·6 in. long; ♂ spikes fascicled on a long, slender rhachis, ♀ flowers distant in solitary or fascicled spikes; capsules suborbicular or broader than long, apex retuse or sub-bilobed, .5–1 in. long, 1–1·5 in. wide.....8. *oppositifolia*.

Bases of leaves cordate or truncately cordate:—

♂ spikes simple, 1–4-nate. Stem slender, pale; leaves ovate, acuminate, 2–3·5 in. long, 1–2 in. wide; petioles .8–1·8 in. long; rhachis of ♂ spike capillary up to 3 in. long.....9. *Wightii*.

♂ spikes paniced, very rarely simple:—

Stem woody, often prickly below, arising from a hard woody knot 3–4 in. diam. which below gives forth 1–3 or sometimes more tubers; leaves ovate-hastate, sometimes nearly orbicular, those near the apex often with a rounded base, apex acuminate, up to 5 in. long, secondary nerves irregular; petioles long; capsules subquadrate or orbiculate, .6–8 in. long, 1–1·5 in. wide.....10. *glabra*.

Stem woody, stout, often prickly below, the tubers growing out direct from the base of the stem; leaves suborbicular, broadly ovate or subreniform, abruptly acuminate or cuspidate, up to 6 in. long and 6·5 in. wide, secondary nerves regular and nearly parallel, petioles up to 5 in. long; capsules broadly obovate, apex emarginate, up to 1·5 in. wide.....11. *Wallichii*.

Veins of leaves prominent:—

Stem unarmed, smooth, enlarged into a small rhizome emitting long fleshy tuber-bearing fibres; leaves variable, usually ovate or ovate-lanceolate, apex tapering to an acute point, base deeply to shallowly cordate, 7–9-ribbed, 1·5–4 in. long, .7–2 in. wide, veins rather regular, close and parallel; petioles .5–1·6 in. long; ♂ spikes 1–3-nate in the

axils or on leafless axillary shoots; capsules suborbicular, slightly broader than long, 1—1.5 in. wide.....12. *belophylla*.
 Stem terete, glabrous, unarmed; leaves mostly alternate, elliptic or oblong, acuminate, mucronate, base narrowed or rounded, 3-ribbed, up to 5 in. long and 2.6 in. wide, veins irregular, distant; petioles up to 1.5 in. long; ♂ spikes short, fascicled in long panicles, ♀ spikes short, solitary, usually simple; capsules transversely oblong, apex retuse, 1—1.25 in. diam.....13. *intermedia*.

Stems winged or regularly angled; axis of ♂ spikes zig-zag:—

Whole plant reddish when dry; stems angled, sometimes subulate, unarmed; tubers long-stalked, deep underground; leaves ovate or lanceolate, acuminate, truncately to deeply cordate, 1.75—4.5 in. long, .75—2 in. wide, secondary nerves close, rather regular and subparallel, petioles 1—2.5 in. long; ♂ spikes short, 1—4-nate or subverticillate on slender axillary branchlets; capsules reniform, retuse, .8—1 in. long, 1—1.6 in. wide.....14. *Hamiltonii*.

Plant not conspicuously reddish when dry; stems 4—5- (sometimes 6—8- at the base) winged, wings sometimes reduced to ribs, usually with scattered broad-based prickles; tubers shallow or deep underground, but without long stalks; leaves usually broadly ovate or subrotund, suddenly cuspidate, sometimes rounded, base cordate with a broad sinus, upper smaller and narrower, 2.5—8.5 in. long, 1.5—5 in. wide; petioles 1.5—4.5 in. long; rhachis of ♂ spike winged, ♂ spikes 1—3-nate or subverticillate on axillary branchlets; capsules broadly obcordate, 1—1.5 in. wide.....15. *alata*.

Stems densely pubescent, unarmed, woody, directly producing a long cylindric tuber; leaves broadly ovate or suborbicular, acuminate or cuspidate, base cordate, 3—7-in. long, 2.25—4 in. wide, pubescent at least on the nerves below; petioles 1—2.25 in. long, pubescent; ♂ spikes pubescent, 1—3-nate on axillary panicles up to 14 in. long; capsules subcordate; .5—7 in. long, 1 in. wide, rarely quite glabrous.....16. *anguina*.

1. DIOSCOREA ESCULENTA, Burk. *D. spinosa*, Roxb.; F. B. I. vi. 291.
D. fasciculata, Roxb.; F. B. I. vi. 296.

Cultivated on the E. and W. Coasts; probably nowhere truly wild but occurring as an escape. Very variable under cultivation when it often loses the spines on the roots. Vern. *Tel.* Tivvi tige, Tippa tige; *Tam.* Musilam valli kilangu, siruvalli kilangu; *Mal.* Mullu kilangu, Cheru kilangu.

2. DIOSCOREA BULBIFERA, Linn.; Wt. Ic. t. 878. *D. sativa*, Thunb. non Linn.; F. B. I. vi. 295.

Wild on the W. Coast, in Coimbatore and along the whole of the E. Coast Districts. Cultivated in many localities. Vern. *Hind.* Karukanda; *Tam.* Pannu kilangu; *Kan.* Heggenasu.

Var. *vera*, Pr. & Burk. Tubers and bulbils small, acrid (wild).

Var. *sativa*, Pr. & Burk. Tubers almost entirely absent, bulbils large and edible (cultivated).

3. DIOSCOREA HISPIDA, Dennst. *D. daemona*, Roxb.; F. B. I. vi. 289; Wt. Ic. t. 811.

W. and E. Coast Districts, up to 1,000 ft.; Anamalai Hills (Wight, Beddome); Hyderabad State (Heyne).

One of the most important natural famine foods. Vern. *Tel.* Tella gini-geddala, Puli-dumpā; *Tam.* Pei-perendai; *Mal.* Podava-kilangu.

4. DIOSCOREA TOMETOSA, Heyne; F. B. I. vi. 289.

In all Districts, up to 4,000 ft. Very common.

Flowers purplish. Vern. *Tel.* Burdi gaddi, Tegadumpa, Nalla

- tiga, Nadang, Adavi-denda-tiga; *Tam.* Nalveli-kilangu, Shaval-kilangu; *Mal.* Inthi-kachchil, Núli, Chávú, Píndi.
5. *DIOSCOREA PENTAPHYLLA*, Linn.; F. B. I. vi. 289; Wt. Ic. t. 814.
In all districts, up to 4,000 ft.
Flowers greenish, fragrant. Vern. *Tel.* Duka-pendalam, Moyakku-pendalam, Pendi-muka-tiga, Adavi-ginusu-tiga; *Tam.* Chedukundi, Vallai-kodi; *Mal.* Núran, Chaval, Korna-pídan.
Var. *Linnaei*, Pr. & Burk. Tuber elongate, white, edible; leaves shining.
Var. *Rheedei*, Pr. & Burk. Tuber elongate, white, edible; leaves dark when dry, bulbils much elongated.
Var. *communis*, Pr. & Burk. Tuber short, inedible; leaves rusty-pubescent.
6. *DIOSCOREA KALKAPERSHADII*, Pr. & Burk.
Shevaroy Hills (Perrottet).
Capsules unknown. Perhaps only a coarse variety of *D. pentaphylla*, L.
7. *DIOSCOREA SPICATA*, Roth; F. B. I. vi. 291.
Travancore and Tinnevely Hills, 3,000—5,000 ft.
Vern. *Mal.* Atthi-kilangu, Kavalai.
8. *DIOSCOREA OPPOSITIFOLIA*, Linn.; F. B. I. vi. 292; Wt. Ic. t. 813.
In all districts, 500—5,000 ft.
Vern. *Tel.* Yella-gadda; *Tam.* Kavala-kodi, Thavaikachchu; *Mal.* Kanji; *Kan.* Bellarai.
Var. *Linnaei*, Pr. & Burk. Leaves lanceolate or ovate; axis of ♂ inflorescence usually brown-pubescent.
Var. *dukhunensis*, Pr. & Burk. Leaves ovate; axis of ♂ inflorescence glabrous or nearly so.
9. *DIOSCOREA WIGHTII*, Hook. f.; F. B. I. vi. 291.
Courtallam (Wight).
♀ flowers and capsules unknown.
10. *DIOSCOREA GLABRA*, Roxb.; F. B. I. vi. 294.
Godavari District (Barber).
11. *DIOSCOREA WALLICHII*, Hook. f.; F. B. I. vi. 295. *D. aculeata*, Linn.; F. B. I. vi. 296; Wt. Ic. t. 2060 (excluding the mature fruit).
W. Coast and Gháts; N. Circars; Mysore at Chickenhalli at 3,000 ft. (Meebold).
Vern. *Tel.* Cheranga; *Mal.* Vara-kilanga, Katta-kilanga, Váli.
12. *DIOSCOREA BELOPHYLLA*, Voight.
W. Gháts, on the crests.
13. *DIOSCOREA INTERMEDIA*, Thw.; F. B. I. vi. 297.
Malabar (Barber); Travancore (Bourdillon).
14. *DIOSCOREA HAMILTONII*, Hook. f.; F. B. I. vi. 295.
W. Coast and Gháts, up to 4,000 ft.
Tubers eaten. Vern. *Mal.* Veinti.
15. *DIOSCOREA ALATÁ*, LINN.; F. B. I. vi. 296; Wt. Ic. t. 810. *D. globosa*, Roxb.; F. B. I. vi. 296; Wt. Ic. t. 812.
Widely cultivated; nowhere truly wild. Vern. *Tel.* Pendalam, Dukka-pendalam, Kavili-gadda; *Tam.* Mullu-valli, Siru-valli,

Vettilai-valli, Atthi-kavali, Eyamichavali, Kappa-kavali, Kappan-kachchil; *Mal.* Kachchil-kilangu, Thamban; *Kan.* Tuna-genasu.

16. *DIOSCOREA ANGUINA*, Roxb.; F. B. I. vi. 293.

Rampa Hills at 2,500 ft. (Ramaswami, Narayanswami); Travancore (Calder and Ramaswami).

Tubers edible, but not much sought after.

2. *Trichopus*, Gaertn.

Small, erect, perennial herbs; stem short. *Leaves* terminal, 3—7-costate, petioled. *Flowers* small, bisexual, fascicled at the base of the leaves. *Perianth* campanulate, subequally 6-lobed. *Stamens* 6, on the base of the perianth-lobes; anthers subsessile, short and broad, connective produced. *Ovary* inferior, 3-celled; ovules 2-superposed in each cell; style very short; stigmas 3, short, reflexed, bifid. *Fruit* 3-winged, indehiscent. *Seeds* oblong, dorsally grooved; embryo minute in a cartilaginous albumen.

TRICHOPUS ZEYLANICUS, Gaertn.; F. B. I. vi. 297. *Trichopodium zeylanicum*, Bedd. Ic. Pl. Or. t. 290.

Tinnevely and Travancore Hills.

Stems several from a nodose rhizome, slender, 1—5 in. long; leaves ovate-lanceolate to broadly triangular-ovate, apex acute and minutely apiculate, obtuse or rounded, base more or less deeply cordate with a wide sinus, 2·5—5·5 in. long, 1·3—3 in. wide; petioles 1—2·75 in. wide; flowers 4 or 5 together; perianth dark-brown, lobes lanceolate, acute; pedicels slender, 1 in. long, lengthening and thickening below the ellipsoid, 5—75 in. long fruit.

Family CLVIII. ROXBURGHACEAE.

Erect or climbing herbs; rootstock tuberous or creeping. *Leaves* alternate, opposite or whorled, simple, petioled, 3- or more-ribbed, cross-nervules parallel. *Flowers* regular, 2-sexual on axillary peduncles. *Perianth* superior or half-superior, in 2 whorls of 2 subequal, free or more or less connate segments each. *Stamens* 4, on the base of the perianth-segments or subhypogynous; anthers dorsifixed. *Ovary* 1-celled; ovules 2 or more, erect from the base or pendulous from the apex, anatropous; stigmas 1—3, subsessile. *Fruit* a 2-valved capsule. *Seeds* oblong, testa coriaceous; embryo long, albumen hard.

Stemona, Lour.

Stem erect or twining; root tuberous. *Leaves* ovate or lanceolate, 3—13-ribbed. *Flowers* rather large, solitary or few subracemose. *Perianth* segments lanceolate, many-nerved. *Stamens* subhypogynous; filaments more or less connate into a ring; anthers erect, linear, connective produced into a very long linear appendage. *Ovary* free, compressed; ovules 2 or more, erect; stigma small, pointed. *Capsule* ovoid or oblong, compressed. *Seeds* ovoid or oblong, terete, grooved, beaked.

STEMONA TUBEROSA, Lour. ; F. B. I. vi. 298. *Roxburghia gloriosoides*, Jones ; Roxb. Cor. Pl. t. 32. *R. Viridiflora*, Sm. ; Wall. Pl. As. Rar. t. 282.

N. Circars as far south as Kambakkam Hill in the Chingleput District, 300—4,000 ft.

Stems twining ; leaves membranous, opposite, rarely alternate, ovate, cuspidate to caudate, base truncately to deeply-caudate with rounded lobes, rarely abruptly cuneate, 7—13-ribbed, up to 10·5 in. long and 6 in. wide, cross-nervules straight, very close, petioles up to 3·5 in. long ; flowers 1—3, 1—2 in. long, segments acuminate, greenish with purple nerves ; stamens large, filaments red, stout, deeply grooved in front with crenulate margins, connective green ; capsule ovoid-oblong, 1·5 in. long, 5—8-seeded. Vern. Tel. Kanipu tiga, Ijedigadda.

Var. *minor*, Fischer. *S. minor*, Hook. f. ; F. B. I. vi. 298 *Roxburghia gloriosoides*, Wt. Ic. t. 2061. All parts smaller ; leaves not caudate, base narrowed or rounded, rarely more than 7-ribbed ; flowers rarely exceeding 1 in. long, segments usually acute.

Family CLIX. LILIACEAE.

Herbs, sometimes climbing, rarely shrubby or arboreous with secondary growth in thickness ; roots fibrous or tuberous or a creeping rhizome, or bulbs or corms. *Leaves* various, cauline or radical, sometimes functionally replaced by cladodes, sometimes fleshy, usually parallel-veined. *Flowers* usually regular and 2-sexual, axillary or terminal, solitary, twin, spicate, umbelled, racemose, fascicled or paniced. *Perianth* inferior, free from the ovary, herbaceous or petaloid, 6- (rarely 4- or 8-) merous in 2 series, imbricate, rarely valvate, in bud. *Stamens* 6, rarely 3 or less, hypogynous or on the perianth lobes ; filaments free or connate ; anthers oblong or linear, often versatile. *Ovary* superior, 3-celled ; ovules 2 or more in the inner angles of each cell, anatropous, rarely orthotropous ; style usually simple, rarely 3, usually long, rarely short or 0. *Fruit* a berry or capsule, usually 3-celled, rarely 1-celled. *Seeds* globose or flattened ; embryo small, terete, surrounded by the horny or fleshy albumen.

Leaves minute, often spinescent scales, bearing axillary tufts of needle-like or slightly flattened cladodes.....1. *Asparagus*.
Leaves well developed:—

Climbing plants:—

Leaves not ending in a tendril ; flowers small, whitish or greenish...2. *Smilax*.

Leaves ending in a tendril ; flowers large, yellow and red.....3. *Gloriosa*.

Erect undershrubs or herbs:—

Leaves very thick, cartilaginous or fleshy:—

Margins of leaves not spinous ; perianth narrowly tubular, divided into linear segments for at least half its length, white or cream-coloured

4. *Sansevieria*.

Margins of leaves spinous ; perianth tubular, shortly toothed, reddish-yellow and green.....5. *Aloe*.

Leaves not very thick, neither cartilaginous nor fleshy:—

Undershrubs or stout herbs with a definite above-ground leafy stem:—

Flowers less than 2 in. long:—

Leaves sheathing at the base:—

Perianth segments connate below in a tube.....6. *Dracaena*.

- Perianth segments free to the base.....7. **Dianella**.
 Leaves sessile or shortly petioled, not sheathing.....8. **Disporum**.
 Flowers trumpet-shaped, at least 5 in. long.....9. **Lilium**.
 Herbs without distinct above-ground stems:—
 Flowers in heads or umbels sheathed by 1 or more spathes.....**Allium**.
 Flowers racemose or fascicled in racemes:—
 Rootstock small with fleshy or tuberous roots:—
 Leaves semi-terete, fistular.....10. **Asphodelus**.
 Leaves flat, not fistular.....11. **Chlorophytum**.
 Rootstock a bulb or corm:—
 Flowers several to many, racemose on a simple, naked scape:—
 Flowers distant, usually appearing before the leaves, dingy-brown,
 .5 in. or more long, pedicels 1 in. long; seeds compressed....12. **Urginea**.
 Flowers close, appearing with the leaves, greenish-purple, .25 in. or
 less long, pedicels under 1 in. long; seeds subglobose.....13. **Scilla**.
 Flowers solitary or few corymbose; scape with a few leaves....14. **Iphigenia**.

1. *Asparagus*, Linn.

Scandent or erect undershrubs, rarely herbs; rootstock stout, creeping, sometimes bearing tubers. *Leaves* reduced to minute, often spinescent, scales which bear in their axils tufts of more or less leaf-like acicular, triquetrous or flattened cladodes. *Flowers* small or minute, 2- (rarely 1-) sexual, regular, axillary, solitary, fascicled, umbelled or racemed; pedicels jointed. *Perianth* petaloid, campanulate, 6-partite. *Stamens* 6, on the bases of the perianth-segments; filaments free; anthers oblong. *Ovary* 3-celled, 3-gonous; ovules 2 or more in each cell; style 1, columnar; stigmas 3. *Fruit* a globose, pulpy berry. *Seeds* 1—6, testa black, brittle; embryo dorsal.

Flowers solitary, clustered or umbelled, not racemed:—

Leaves not spinescent. Stem slender, unarmed, terete, striate; branchlets sulcate; cladodes 3—6-nate, firm, up to 2 in. long; flowers in dense clusters, pedicels up to .5 in. long, jointed below the middle.....1. *Rottleri*.

Leaves distinctly spinous:—

Stem erect, tall, smooth; branchlets grooved; spines straight, long; cladodes 6—12-nate, triquetrous, acuminate, .16—35 in. long; flowers 1—2 together, pedicels jointed above the middle.....2. *Fysoni*.

Stem scandent, slender, terete, smooth; branchlets grooved; spines short, recurved; cladodes 6—15-nate, terete, mucronate, .16—25 in. long; flowers solitary or few and umbelled, pedicels jointed in the middle.....3. *asiaticus*.

Flowers racemed:—

Cladodes triquetrous or very slightly compressed:—

Cladodes 2—6-nate, falcate-divaricate, sometimes slightly compressed, .5—1.5 in. long. Stem scandent, woody; branchlets angular; spines strong, long, straight or decurved; racemes solitary or fascicled, simple or branched, many- or few-flowered, 1—3 in. long; bracts minute; pedicels slender, jointed at the middle.....4. *racemosus*.

Cladodes 3—6-nate, stout, acuminate, spreading, .25—35 in. long; bracts comparatively large. Otherwise as *racemosus*.....5. *laevissimus*.

Cladodes flat, falcate-ensiform, 2—6-nate, acute or acuminate, .35—1 in. long. Stem subscaudent, terete, smooth; branchlets angled; spines short; racemes often fascicled, 1—3 in. long; pedicels jointed at the middle.....6. *gonoclados*.

1. *ASPARAGUS* ROTTLEI, Baker; F. B. I. vi. 315.

Precise locality not known; probably South India (Rottler).

2. *ASPARAGUS* FYSONI, Macbride; *A. subulatus*, Steud.; F. B. I. vi. 315.

A. asiaticus, Wt. Ic. t. 2055.

Nilgiri, Anamalai and Pulney Hills, 4,000—8,000 ft.

3. *ASPARAGUS ASIATICUS*, Linn.; F. B. I. vi. 316.
Bellary District (Beddome); also Rottler without precise locality.
4. *ASPARAGUS RACEMOSUS*, Willd.; F. B. I. vi. 316; Wt. Ic. t. 2056.
In all Districts, sea-level to 4,500 ft. Very common. Vern. *Ur.* Mohajolo; *Tel.* Pilli-gaddalu, Toalla-gaddalu; *Tam.* Ammai-kodi, Kadumulla, Nili-chedi.
5. *ASPARAGUS LAEVISSIMUS*, Steud.; F. B. I. vi. 317.
Nilgiri Hills at about 6,000 ft.
Hardly more than a variety of *A. racemosus*, Willd.
6. *ASPARAGUS GONOCADOS*, Baker; F. B. I. vi. 318.
W. Ghats, 4,000—6,000 ft.

2. *Smilax*, Linn.

Climbing shrubs (rarely erect herbs); stem often prickly. *Leaves* alternate, rarely opposite, 3—9-ribbed, reticularly veined; petioles usually short, generally bearing a tendril on either side above the base, often dilated into a narrow or broad sheath. *Flowers* dioecious, umbellate. *Perianth* of 6, free, subequal segments. *Stamens* in ♂ 6 or more on the base of the perianth-segments; filaments free, erect; anther oblong, didymous or the cells separated by the forking of the connective. *Pistillode* 0. *Staminodes* in ♀ 3 or 6, filiform. *Ovary* 3-celled, 3-gonous; ovules 1—2 in each cell, orthotropous, pendulous; style short or 0; stigmas 3, stout, recurved. *Fruit* a globose berry. *Seeds* solitary or more often 2, rarely 3, hemispheric; embryo small; albumen horny.

Umbels sessile on an axillary peduncle 2—6 in. long, sometimes forming a terminal panicle by the suppression of the upper leaves. Branches rather slender, armed or not; leaves ovate-deltoid, hastate-lanceolate or broadly cordate, sometimes a little broader than long, acute or acuminate, base more or less deeply cordate, 5—9-ribbed, margins and veins below sometimes prickly, 1.6—4.5 in. long, 1—3.2 in. wide; petioles .5—1 in. long, sometimes armed, hardly sheathed at the very base; tendrils from near the base.....1. *aspera*.

Umbels not sessile:—

Umbels 1—3 on an axillary peduncle; sheath of petiole narrow not auricled:—

Branches rather stout, more or less angled, armed or not; leaves very variable; lanceolate, elliptic, broadly oblong or orbicular, acute or abruptly cuspidate, base narrowed, rounded or cordate, 3—7 or 9-ribbed, up to 14 in. diam.; petioles up to 2 in. long.....2. *zeylanica*.

Branches rather stout, terete, very sparsely or not armed; leaves broadly ovate or suborbicular, apex rounded or bluntly cuspidate, sometimes acuminate, base rounded or shallowly cordate, 5—7-ribbed, up to 5 in. long; petioles up to 1.75 in. long.....3. *Wightii*.

Umbels many, alternate or verticillate on an axillary peduncle. Branches stout, armed or not; leaves elliptic, ovate or very broadly oblong, apex rounded, sometimes retuse, or with a short hard cusp, base rounded or subcordate, 3—7-ribbed, 4—7 in. long, 2—6 in. wide; petioles up to 2 in. long, broadly sheathed for about half their length, the sheath auricled, often amplexicaul, at the base...4. *prolifera*.

1. *SMILAX ASPERA*, Linn.; F. B. I. vi. 306. *S. maculata*, Roxb., Wt. Ic. t. 2059.

W. Ghâts, 4,000—7,000 ft.; Vizagapatam District at Ventala, 4,000 ft. (A. W. Lushington).

Leaves often blotched with white.

2. *SMILAX ZEYLANICA*, Linn.; F. B. I. vi. 309. *S. macrophylla*, Roxb.; F. B. I. vi. 310. *S. ovalifolia*, Roxb.; Wt. Ic. t. 809.

In all Districts, near sea-level to 6,000 ft. Vern. *Tel.* Kondagurvatiga; *Tam.* Kattu-kodi.

3. *SMILAX WIGHTII*, A. DC.; F. B. I. vi. 310. *S. zeylanica*, Wt. Ic. tt. 2057-8.

Nilgiri and Anamalai Hills, 4,000—8,000 ft.

Doubtfully distinct from the last species.

4. *SMILAX PROLIFERA*; Roxb.; F. B. I. vi. 312.

In all Districts, from 2,500 ft. upwards. Vern. *Ur.* Mitri; *Kan.* Nirubetta.

3. *Gloriosa*, Linn.

Climbing herbs, stems leafy; rootstock tuberous, naked. *Leaves* alternate, opposite or ternately whorled, midrib prominent, tip elongate, spiral, functioning as a tendril. *Flowers* large, axillary, usually solitary; pedicels reflexed near the tip. *Perianth* petaloid, persistent; segments 6, free, spreading or reflexed, narrow, margins usually undulate. *Stamens* 6, hypogynous; filaments filiform; anthers linear, dorsifixed, versatile, extrorse. *Ovary* 3-celled; ovules many in each cell; style filiform, sharply deflexed; apex 3-fid, segments subulate, stigmatose within. *Fruit* a large, coriaceous, septicidal capsule. *Seeds* subglobose; testa spongy; embryo cylindric.

GLORIOSA SUPERBA, Linn.; F. B. I. vi. 358; Wt. Ic. t. 2047.

In all Districts; sea-level to 7,000 ft. Common, often climbing on hedge-row plants.

Stem herbaceous, up to 20 ft. long; tubers cylindric, large, simple or forked, white; leaves linear- to ovate-lanceolate, apex tapering, base rounded or cordate, 3—7.5 in. long (excluding the coiled, tendril-like tip), .5—2 in. wide, sessile or nearly so; pedicels rather stout, up to 7 in. long; perianth-segments linear, acute, margins crisply waved, up to 3.5 in. long, at first greenish, then yellow, passing through orange and scarlet to crimson; capsules linear-oblong, up to 2.7 in. long. The Glory Lily. The tubers are poisonous. Vern. *Hind.* Karihari; *Ur.* Mcheria-phulo, Agni-sikha; *Tel.* Adivi-nabhi, Kalappa-gadda, Potti-dumpa, Ganjeri; *Tam.* Kalap-paik-kilangu, Kannuvelli; *Mal.* Mettonni.

4. *Sansevieria*, Thunb.

Stout, usually fleshy herbs; rootstock short, often stoloniferous, or a creeping rhizome. *Leaves* narrow, cartilaginous or fleshy, flat or terete, nerves immersed. *Flowers* racemed on a stout scape. *Perianth*-tube slender, lobes 6, long, narrow. *Stamens* 6, on the perianth-tube; filaments filiform; anthers dorsifixed. *Ovary* attached by a broad base, 3-celled; ovules solitary in each cell, erect; style filiform; stigma simple. *Fruit* membranous, indehiscent, pericarp evanescent. *Seeds* 1—3, large, globose, fleshy, ripening outside the pericarp.

SANSEVIERIA ROXBURGHIANA, Schult. f.; F. B. I. vi. 271. *S. zeylanica*, Roxb. Cor. Pl. t. 184.

In all Districts except the W. Coast; sea-level to 3,500 ft.

Stemless; rootstock creeping; leaves linear; deeply concave-channelled, rounded or obtusely keeled on the back, tapering to a stout, subulate point, 65—2 ft. long, green transversely marked with a number of darker bars, edges often whitish when old; scape 1—2.5 ft. high, raceme 1—1.5 ft. long; bracts membranous; flowers about 4 in a cluster, 6—8 in. long, white, pedicels jointed near the middle; seeds .25 in. diam. The Bow-string Hemp. Vern. *Hind.* Marúl; *Tel.* Chamakada-nar, Sagal; *Tam.* Marul, Mottamanji.

5. *Aloe*, Linn.

Dwarf plants, less often arboreous. *Leaves* fleshy, forming rosettes or 2-ranked, usually spinose-dentate. *Flowers* in terminal, simple or branched racemes. *Perianth*-segments united into a cylindric or campanulate, sometimes curved tube, the 6 tips usually free. *Stamens* 6, as long as or longer than the perianth; filaments inserted in a pit in the connective. *Fruit* a loculicidal capsule.

ALOE VERA, Linn.

Introduced and run wild, especially in hedge-rows, in the drier localities, up to 2,500 ft. The Barbados Aloe.

Leaves dense, aggregated, ensiform, 1—2 ft. long, 2—4 in. wide, with horny prickles on the margins; scape 2—3 ft. long; perianth reddish-yellow and green, cylindric, .75—1 in. long. Vern. *Tam.* Kathalai.

6. *Dracaena*, Linn.

Shrubs, sometimes climbing, or small trees. *Leaves* alternate or crowded and subterminal, sessile or petioled, either with strong ribs or with many fine parallel nerves. *Flowers* in terminal, rarely also axillary, racemes, panicles, heads or umbels; bracts small. *Perianth* tubular, campanulate or funnel-shaped, cleft into 6 narrow lobes. *Stamens* 6, at the base of the perianth; filaments filiform; anthers versatile. *Ovary* 3-celled; ovules solitary in each cell, erect; style filiform; stigma capitate. *Fruit* a globose, didymous or 3-lobed berry. *Seeds* globose or angular; testa thickened; embryo small; albumen horny.

DRACAENA TERNIFLORA, Roxb.; *F. B. I.* vi. 328. *D. terminalis*, Wt. *l.c.* t. 2054.

W. Gháts, 250—4,000 ft.; Rampa Hills, 2,000—3,000 ft. (Gamble, Narayanaswami).

A straggling shrub, stems slender, sometimes rooting near the base; leaves elliptic-lanceolate, acute or acuminate, narrowed to the base, 4—9 in. long, 1.4—2.5 in. wide; petioles 1—3 in. long, with widened, amplexicaul base; raceme sometimes branched, usually shorter than the leaves; flowers 1—3 together, 6—9 in. long, cleft about half way, white; pedicels short, jointed below the flower; berry red, 1—3-seeded; seeds 2—3 in. diam.

7. *Dianella*, Lam.

Herbs, often stout, usually branched and stoloniferous. *Leaves* rigid, distichous, sometimes rosulate, often equitant. *Flowers* in cymose

panicles, nodding; pedicels jointed at the top. *Perianth* marcescent, 6-partite; segments spreading. *Stamens* 6, hypogynous or the 3 inner on the bases of the perianth-segments; filaments much thickened; anthers basifixed, reflexed, opening by terminal pores or short slits. *Ovary* 3-celled; ovules 4—8 in each cell; style filiform; stigma minute. *Fruit* a globose berry. *Seeds* few, ovoid or compressed; testa black, shining; albumen fleshy.

DIANELLA ENSIFOLIA, Red.; F. B. I. vi. 337; Wt. Ic. t. 2053.

Anamalai, Pulney and Tinnevely Hills, 3,000—4,000 ft., in evergreen forest.

A stout herb up to 3 ft. high; leaves equitant, linear-ensiform, 1—3 ft. long, .7—1 in. wide; sheath acutely keeled, keel and margins smooth or scabrid; panicle 1—2 ft. long, scape slender, angled and sulcate; flowers white, greenish or bluish, .25—.35 in. long; berry .3—.4 in. diam., cobalt-blue or dark-purple.

8. *Disporum*, Salisb.

Erect herbs, sometimes stout; stems angular, leafy; rootstock creeping. *Leaves* alternate or sometimes opposite, sessile or shortly petioled, strongly nerved, almost ribbed. *Flowers* in terminal or rarely also axillary, few-flowered umbels. *Perianth* petaloid, campanulate, deciduous, 6-partite, segments erect, their bases saccate or spurred. *Stamens* 6, hypogynous; filaments erect, usually flattened; anthers dorsifixed, extrorse. *Ovary* 3-celled; ovules 2—6 in each cell; style long or short; stigmas 3, short. *Fruit* a pisiform berry. *Seeds* few, subglobose; testa brown; albumen horny; embryo small.

Perianth-segments spurred at the base; segments lanceolate, acute, minutely ciliate. *Leaves* oblong-lanceolate, acuminate, base rounded, 2—4 in. long, .75—1.5 in. wide; flowers in sessile or shortly peduncled umbels, .5—.7 in. long, white, greenish or purplish.....1. *calcaratum*.

Perianth segments not spurred at the base, saccate or subsaccate:—

Umbels usually peduncled, peduncles up to .6 in. long; fruiting pedicels 1—1.4 in. long. *Leaves* narrow- to ovate-lanceolate, acuminate, base rounded, sessile or shortly petioled, 2.5—4 in. long, .6—1.75 in. wide; perianth-segments spatulate or lanceolate, acute or acuminate, white or dull purple, .8—.9 in. long...2. *pullum*. Umbels sessile, very rarely very shortly peduncled; fruiting pedicels .7—.9 in. long. *Leaves* ovate to suborbicular, acuminate, base rounded, 1.5—4.8 in. long, .75—2.7 in. wide; petioles .12—.3 in. long, rarely 0; flowers white, segments broadly oblong, acute or acuminate, .3—.6 in. long.....3. *leschenaultianum*.

1. *DISPORUM CALCARATUM*, D. Don; F. B. I. vi. 359.

Vizagapatam District at Lochili, 4,000 ft. (A. W. Lushington).

2. *DISPORUM PULLUM*, Salisb.; F. B. I. vi. 360. *Uvularia umbellata*, Wall. Pl. As. Rar. t. 269.

Vizagapatam District at Antala, 1,500 ft. (Gamble); Godavari District at Ethakonda, 3,000 ft. (Narayanswami).

3. *DISPORUM LESCHENAUXTIANUM*, D. Don; F. B. I. vi. 360; Wt. Ic. t. 2048; *D. mysorensis*, Wt. Ic. t. 2049.

W. Ghâts, 3,000—7,500 ft.

Var. *angustifolium*. *Leaves* linear-lanceolate, caudate-acuminate, base acute, 3—5.5 in. long, .5—1.2 in. wide, calbrid on the nerves beneath.

Nilgiri Hills at Coonoor (Prain).

(All these are very closely allied and may be geographical races rather than separable species.)

9. *Lilium*, Linn.

Tall, unbranched, leafy herbs; root bulbous. *Leaves* few or many, often verticillate. *Flowers* usually very large, axillary or terminal, solitary or 2 or several umbelled or racemed. *Perianth* petaloid, funnel-shaped, 6-partite, usually narrowly nectariferous at the base. *Stamens* 6, hypogynous; filaments long, filamentous or slightly flattened; anthers dorsifixed, versatile. *Ovary* sessile, cylindric, 3-celled; ovules many in each cell, horizontal; style long; stigma globose, sub-3-lobed, rarely 3-fid. *Fruit* a coriaceous, erect, loculicidal, 3-valved, usually 6-angled capsule. *Seeds* vertically compressed; testa pale, membranous.

LILIUM NEILGHERRENSE, Wt. Ic. t. 2031—2; F. B. I. vi. 350. *L. tubiflorum*, Wt. Ic. t. 2033—4. *L. Wallichianum*, Wt. Ic. t. 2035.

Mysore (Lobb); Nilgiri and Pulney Hills; Billigiri Rangan Hills (Fischer); Anamalai Hills (Fischer); Tinnevely Hills; 5,000—8,000 ft.

Stem up to 3 ft. high; leaves sessile, linear- to elliptic-lanceolate, acute, tip callous, strongly nerved, 2·5—6 in. long, 3—1·2 in. wide; flowers 1—3 together, terminal or in the upper axils, 6—10 in. long, white; apex of segments shortly callous, puberulous. The Nilgiri Lily.

10. *Asphodelus*, Linn.

Annual or perennial herbs; root-fibres slender or fleshy. *Leaves* radical, linear, triquetrous or terete and fistular. *Flowers* in simple or paniced racemes, solitary in the axils of small scarious bracts. *Perianth* petaloid, segments 6, free or shortly connate below. *Stamens* 6, hypogynous; filaments dilated below and embracing the ovary; anthers versatile, dorsifixed, filament inserted in a pit. *Ovary* sessile, globose, 3-celled; ovules 2 in each cell, collateral; style filiform; stigma sub-3-lobed. *Fruit* a loculicidal, 3-valved capsule. *Seeds* 1—2 in each cell, triquetrous; testa crustaceous, black; embryo nearly as long as the cartilaginous albumen.

ASPHODELUS TENUIFOLIUS, Cav.; F. B. I. vi. 332. *A. parviflorus*, Wt. Ic. t. 2062.

A weed of fields and gardens. Rare in S. India. Bangalore (Bourne).

Annual; leaves terete, fistular, very slender, acute, 6—12 in. long, base sheathing, glabrous or minutely puberulous; scapes several, 1—2 ft. long, glabrous or sparsely minutely puberulous; flowers white, distant, 1·5—2 in. long; pedicels jointed at or below the middle; capsule 1·5—2 in. in diam., valves transversely wrinkled; seeds sharply 3-angled.

11. *Chlorophytum*, Ker.

Perennial herbs; roots fascicled, often thick, fleshy and tuber-like. *Leaves* radical, clustered, linear or lorate, sometimes broad. *Flowers*

racemose on simple or branched scapes, usually fascicled in the axils of small scarious or large membranous bracts. *Perianth* petaloid, white, marcescent, rarely deciduous; segments 6, free, 3—9-nerved. *Stamens* 6, all hypogynous or the 3 inner shortly adnate to their perianth-segments, included; filaments filiform, often widened above the middle; anthers versatile, linear or oblong, filaments inserted in a small dorsal pit. *Ovary* sessile or subsessile, globose, 3-celled; ovules 4 or more in each cell; style filiform; stigma small. *Fruit* a coriaceous or fleshy, truncate or emarginate, 3-winged or sharply 3-angled, loculicidal, 3-valved capsule. *Seeds* discoid; testa black; embryo rather large, often curved; albumen copious, hard.

Flowers in simple or shortly branched, dense-flowered racemes:—

Leaves narrow-lanceolate or oblanceolate, narrowed into a petiole:—

Scape 2—6 in. long. Collar rather stout; leaves oblanceolate, acuminate, 6—18 in. long (including the broad petiole), 1—2·2 in. wide; bracts longer than the small flowers; pedicels short, jointed near the tip; capsules elliptic-oblong, apex retuse, sharply triquetrous, ·5 in. long.....1. *Heynei*.
Scape 1—2 ft. long:—

Anthers longer than the glabrous filaments. Leaves narrow, lanceolate or oblanceolate, acuminate, 6—24 in. long (including the petiole), 1—2·5 in. wide; scape naked, usually as long as the leaves; pedicels jointed usually below the middle; perianth-segments ·3—·5 in. long; capsules depressed-globose, ·25—·3 in. diam.....2. *arundinaceum*.

Anthers shorter than the papillose filaments. Leaves narrowly oblanceolate, usually recurved, acuminate, 12—18 in. long, 1—2 in. wide; scape usually longer than the leaves with 2—3 sheaths; pedicels jointed usually above the middle; perianth-segments ·25—·33 in. long; capsules globose, emarginate, ·25—·3 in. diam.....3. *glaucum*.

Leaves linear or lorate, not or rarely narrowed into a petiole:—

Leaves falcate; filaments glabrous:—

Scape usually longer than the leaves; perianth-segments 7—9-nerved, ·5—·66 in. long. Root-fibres long, cylindric, tuber-like; leaves sessile, usually ensiform, 8—24 in. long, ·6—1·5 in. wide, margins usually crisped; scape 6—36 in. long; pedicels jointed at or below the middle; anthers as long as the filaments; capsules orbicular, retuse, ·3—·5 in. long, 4—6-seeded.....4. *tuberosum*.
Scape shorter than the leaves; perianth-segments 3-nerved, ·3 in. long. Root-fibres short or long, fleshy or not; leaves ensiform, 6—12 in. long, ·7—1 in. wide; pedicels jointed at or above the middle; anthers shorter than the filaments; capsules broadly obcordate, ·25—·3 in. across, 2—5-seeded.

5. *malabaricum*.

Leaves not falcate; filaments papillose. Root-fibres cylindric, often tuber-like; leaves linear, 7—18 in. long, ·5—1 in. wide, slightly narrowed at the base; scape as long or longer, naked; pedicels jointed about the middle; perianth-segments 3—5-nerved, ·33—·5 in. long; anthers longer than the filaments; capsules obcordate, ·33 in. wide, 3—4-seeded.....6. *attenuatum*.

Flowers in simple or branched racemes, remotely scattered, solitary or in pairs:—

Leaves elliptic-lanceolate, acute, 1—2 ft. long, 1—3·5 in. wide; scape tall, paniculately branched. Root-fibres tuber-like; flowers in distant pairs; pedicels jointed at about the middle; perianth-segments ·33 in. long; capsules reniform, apex 2-lobed, ·33 in. across, cells 1-seeded; seeds evenly orbicular in outline

7. *orchidastrium*.

Leaves subdistichous, grass-like, 6—24 in. long; ·12—·5 in. wide; scape filiform, flexuous, 1—12 in. long; flowers distant; pedicels jointed at about the middle, slender; perianth-segments ·15—·2 in. long; capsules subrotund to oblong ·25—·35 in. long, cells 1—4-seeded; seeds irregularly angled.....8. *laxum*.

1. CHLOROPHYTUM HEYNEI, Baker. *C. Heyneanum*, Wall.; F. B. L. vi. 333.

W. Gháts.

2. *CHLOROPHYTUM ARUNDINACEUM*, Baker; F. B. I. vi. 333.
Godavari District (Bourne); Rampa Hills at 1,000 ft. (Narayan-swami); Nilgiri Hills, Karkur Ghát.
3. *CHLOROPHYTUM GLAUCUM*, Dalz.; F. B. I. vi. 334.
Bababudan Hills (Law). Rare.
4. *CHLOROPHYTUM TUBEROSUM*, Baker; F. B. I. vi. 334. *Phalangium tuberosum*, Wt. Ic. t. 2036.
In all Districts, up to 4,500 ft. Vern. *Tel.* Kushelli.
5. *CHLOROPHYTUM MALABARICUM*, Baker; F. B. I. vi. 335.
W. Gháts, 3,000—6,500 ft.
6. *CHLOROPHYTUM ATTENUATUM*, Baker; F. B. I. vi. 335. *Phalangium attenuatum*, Wt. Ic. t. 2037.
W. Gháts, 1,400—7,000 ft.
7. *CHLOROPHYTUM ORCHIDASTRUM*, Lindl.; F. B. I. vi. 336. *Phalangium oligospermum*, Wt. Ic. t. 2038.
W. Gháts, up to 3,000 ft.; Rampa Hills (Ramaswami).
8. *CHLOROPHYTUM LAXUM*, R. Br.; F. B. I. vi. 336. *Phalangium parviflorum*, Wt. Ic. t. 2039.
W. Gháts, 800—6,000 ft.; Vizagapatam District at Endrika, 5,000 ft. (A. W. Lushington).

12. *Urginea*, Steinh.

Bulbous, scapigerous herbs. *Leaves* narrow. *Flowers* racemed, bracteate, often appearing before the leaves. *Perianth* petaloid, 6-partite, campanulate or tubular. *Stamens* 6, at the base of the perianth-segments, included; filaments filiform, sometimes flattened below; anthers linear or oblong, versatile. *Ovary* sessile, 3-celled; ovules numerous in each cell; style filiform, sometimes geniculate; stigma capitate, 3-grooved. *Fruit* an oblong, ellipsoid or globose, 3-quetrous, loculicidal, 3-valved capsule. *Seeds* numerous, flat; testa black, membranous; embryo rather large; albumen fleshy.

Flowers appearing usually before the leaves:—

- Bulb ovoid, 2—4 in. long; leaves linear-lorate, acute, 6—18 in. long; ·5—1·1 in. wide; scape erect, stout, brittle, 12—30 in. long; perianth-segments linear-oblong, ·5—·75 in. long; pedicels ·5—1 in. long; capsules ellipsoid, ·5—·75 in. long
1. *indica*.
- Bulb globose, 1·5 in. diam.; leaves linear, 4—12 in. long, ·2—·5 in. wide; scape slender, 6—18 in. long, flowers drooping; perianth-segments narrowly linear-oblong, ·25—·4 in. long, tips of all or the inner 3 often puberulous; pedicels filiform, ·4—1·5 in. long; capsules ellipsoid, ·4—·5 in. long...2. *coromandeliana*.
- Flowers appearing with the leaves. Bulb ellipsoid, 1 in. diam.; leaves linear, 3—6 in. long, up to 2 in. wide, sometimes filiform; scape as long or longer; perianth segments linear-oblong, ·2 in. long; pedicels ·15—·25 in. long; capsules subglobose; ·3 in. diam.....3. *congesta*.

1. *URGINEA INDICA*, Kunth; F. B. I. vi. 347.
Coimbatore District, 1,000—1,500 ft. (Fischer).
Flowers dingy-brown.
2. *URGINEA COROMANDELIANA*, Hook. f.; F. B. I. vi. 347. *U. Wightiana*, Hook. f.; F. B. I. vi. 347. *U. indica*, Wt. Ic. t. 2063.
Central and Eastern Districts in fairly dry localities, sea-level to 3,500 ft.
Flowers dull-green and purplish.

3. *URGINEA CONGESTA*, Wt. Ic. t. 2064 (left-hand fig.); F. B. I. vi. 348. Sea-coast (Wight).
Flowers white and purplish.

13. *Scilla*, Linn.

Scapigerous herbs; bulb tunicate. *Leaves* radical, linear, lorate or lanceolate. *Flowers* racemed, bracts small; pedicels inarticulate. *Perianth* petaloid, persistent, 6-partite, stellate or campanulate; segments often recurved; *Stamens* 6, perigynous; filaments usually filiform; anthers ovate or oblong, versatile. *Ovary* sessile or shortly stipitate, 3-celled; ovules 1—2—several in each cell; style filiform; stigma small, capitate. *Fruit* a globose or ovoid, membranous, loculicidal, 3-valved capsule. *Seeds* obovoid or globose, never flat, testa thin, black; embryo shorter than the firm albumen.

SCILLA INDICA, Baker; F. B. I. vi. 348. *Ledebouria hyacinthina*, Roth; Wt. Ic. t. 2040. *Barnardia indica*, Wt. Ic. t. 2041.

In all but the West Coast Districts, sea-level to 4,000 ft.

Bulb ovoid or globose, .5—1.5 in. diam., leaves linear, oblong or lanceolate, obtuse or acute, narrowed into a sheathing petiole, rather fleshy, obtusely keeled on the back, 1.5—7 in. long, .3—1 in. wide, dark-green above, often blotched with black, paler and glaucous below; scape 2—6 in. long; flowers greenish-purple, usually dense; perianth-segments linear-oblong, .15—2.5 in. long; capsules subglobose, .2—3 in. diam. Indian Squill. Vern. Tel. Adavi-tellagadda; Tam. Narivengayam.

14. *Iphigenia*, Kunth.

Erect herbs; stem slender; root a tunicate corm. *Leaves* few, cauline, scattered, narrow. *Flowers* small, erect, solitary or few, corymbose. *Perianth* petaloid, 6-partite; segments stellately spreading or recurved, clawed, deciduous. *Stamens* 6, hypogynous; filaments short, flat; anthers oblong, versatile, introrsely attached. *Ovary* sessile, 3-celled; ovules numerous in each cell; styles 3, minute, connate at the base, stigmatose within. *Fruit* a loculicidal, 3-valved capsule. *Seeds* subglobose; testa thin, brown; embryo small; albumen fleshy.

IPHIGENIA INDICA, Kunth; F. B. I. vi. 357. *Anguillaria indica*, R. Br. Wall. Pl. As. Rar. t. 259.

In all Districts except in the wettest localities, sea-level to 7,000 ft. Corm subglobose, .4—7.5 in. diam.; stem 3—10 in. high; leaves sessile, linear, 3—9 in. long, filiform to .28 in. wide, acuminate; flowers dark-purple, sometimes almost black; perianth-segments linear-subulate to linear-spathulate; filaments sometimes papillose; capsule oblong-ellipsoid, .5—7 in. long. Vern. Tam. Nirpanai.

Allium Cepa, Linn.; F. B. I. vi. 337, the Onion, *A. sativum*, Linn.; F. B. I. vi. 337, the Garlic and other species of the genus are cultivated for their edible bulbs.

Yucca gloriosa, Linn., Adam's Needle or the Egg Plant, is cultivated for its fibre for carpet and mat making.

Family CLX. PONTEDERIACEAE.

Fresh-water and marsh herbs, rooting in mud and erect or floating. *Leaves* erect or floating, parallel-nerved. *Flowers* 2-sexual, irregular, in spikes or racemes or subumbellate, arising from the sheath of the uppermost leaf; bracts sheathing, irregular. *Perianth* inferior, petaloid, unequally or subequally 6-fid or -partite. *Stamens* 1—6, inserted at the base of the perianth, equal or one longer; anthers erect or versatile. *Ovary* superior, free, 3-celled or 1-celled with 3 parietal placentas; ovules 1-many on each placenta; style slender; stigma subentire or lobed. *Fruit* a membranous, loculicidal, 3-valved capsule. *Seeds* small, ovoid or ellipsoid; embryo cylindric; albumen horny or floury.

Petioles not enlarged to form floats; perianth-segments free; one anther longer than the rest, its filament horned on one side.....1. **Monochoria**.
Some, at least, of the petioles enlarged to form floats; perianth distinctly tubular below; anthers equal, filaments not horned.....2. **Eichhornia**.

1. **Monochoria**, Presl.

Fresh-water and marsh herbs; rootstock short or creeping. *Leaves* radical and solitary at the top of the emerging stem or branches. *Perianth* campanulate, tube 0. *Stamens* 6, one usually longer than the rest with its filament horned on one side; anthers basifixed, dehiscing by a terminal, ultimately elongate slit. *Ovary* 3-celled; ovules many in each cell; style filiform; stigma minutely 3-lobed. *Capsules* oblong. *Seeds* many, ovoid, many-ribbed.

Rootstock elongate, creeping; leaves hastate, sagittate or cordate, nerves very close and numerous, acute or acuminate, 3—8 in. long, .75—6 in. wide; petioles up to 2 ft. long, of the floral leaves tumid above and embracing spathe-like the short, stout peduncle; flowers crowded, racemose or subumbellate; perianth-segments obovate, .66 in. long, large anther .2 in. long; pedicels .5—1.2 in. long

1. *hastaeifolia*.

Rootstock short, suberect; leaves ovate or subreniform, nerves not very close or very numerous, acute or acuminate, base rounded or cordate, 2—6 in. long, 1—6 in. wide; petioles up to 21 in. long, the flowering channelled above and embracing spathe-like the elongate peduncles; flowers spicately racemose; perianth-segments narrowly obovate, .5 in. long, large anther .12—15 in. long; pedicels .4 in. or less long.....2. *vaginalis*.

1. MONOCHORIA HASTAEFOLIA, Presl.; F. B. I. vi. 362. *Pontederia hastata*, Roxb. Cor. Pl. t. 111.

In the E. Districts, sometimes in brackish water, at low elevations.

Flowers brilliant purplish blue. Vern. *Tel.* Nir-tamara.

2. MONOCHORIA VAGINALIS, Presl.; F. B. I. vi. 363. *Pontederia vaginalis*, Roxb. Cor. Pl. t. 110.

In all Districts, sea-level to 3,000 ft.

Flowers blue, usually spotted with red. Vern. *Tel.* Nir-Kancha.

Var. *plantaginea*, Solms-Laub.; F. B. I. vi. 363. Smaller, often only 3—4 in. high; leaves linear or narrowly ovate, racemes few-flowered.

2. **Eichhornia**, Kunth.

Water plants, rooting in mud or free floating and rooting at the nodes. *Leaves* erect or floating, obovate, rotund or cordate, rarely

lanceolate. *Flowers* in simple, rarely paniculate, sub-spicate racemes from the sheath of the leaf. *Perianth* funnel-shaped, tube short or long, limb irregular, often 2-lipped. *Stamens* 6, declinate, irregularly inserted, upper included; anthers subequal. *Ovary* sessile, 3-celled; ovules many in each cell; style filiform; stigma slightly swollen or shortly 3-6-lobed. *Capsule* ovoid-oblong or linear. *Seeds* ovoid, many-ribbed.

EICHHORNIA CRASSIPES, Solms.

A beautiful introduced American plant which is gradually spreading in waterways and lakes. It has become a very serious pest in Bengal and Burma. The Water Hyacinth. Leaves in a rosette, spoon- or paddle-shaped, apex rounded, 2-8 in. diam.; petioles usually turbinate swollen to form floats, up to 10 in. long; scape erect from the centre of the rosette, 6-10 in. long; flowers violet-blue, 1-1.3 in. long.

Family CLXI. XYRIDACEAE.

Erect tufted, reed-like, scapigerous herbs. *Leaves* radical, elongate, linear or subulate; sheaths short. *Scape* simple, usually naked. *Flowers* 2-sexual, sessile in the axis of rigid, brown imbricating bracts forming a terminal head or spike; bracts orbicular or obovate, coriaceous, persistent. *Perianth* inferior, 2-seriate. *Sepals* 3, deciduous, 2 lateral small, scarious, like bracteoles, narrow, arched, keeled or winged, dorsal sepaloid, broader, arching over the corolla, sometimes absent. *Petals* 3, marcescent, yellow, clawed, claws more or less connate into a tube below. *Stamens* 3 perfect, shorter than the petals and attached near their bases; anthers sagittate. *Staminodes* 3 alternating with the petals, filiform, sometimes 0. *Ovary* superior, free, 1- or incompletely 3-celled, placenta 3, basal, confluent or parietal; ovules many on each placenta; style 3-fid; stigmas capitate or dilated. *Fruit* a loculicidal, 3-valved capsule, or splitting lid-like round the top. *Seeds* numerous, minute, linear or ellipsoid, strongly ribbed; embryo minute, albumen floury.

Xyris, Linn.

Leaves linear, caespitose or distichous. *Scape* naked or with a single leaf. *Flowers* in globose or ovoid, rarely hemispheric or shortly cylindric heads, opening one at a time; bracts usually obtuse and rigid. *Dorsal sepal* broad, more or less distinctly 3-nerved. *Corolla*-tube short or long, lobes ovate. *Staminodes* usually 3, rarely 0, between the corolla-lobes, shortly filiform, bearded or with an aborted anther.

Comparatively robust herbs, 10-38 in. high; leaves distinctly flat, 1 in. or more wide; scapes strongly ridged or flat and 2-edged:—

Leaves obtuse or acute, 5-12 in. long, 1-2.7 in. wide, not margined or scabrid; scape usually longer, 6-20 in. long, terete, strongly ridged, not scabrid; heads subglobose or ellipsoid, 4-1 in. long; bracts orbicular or cuneately obovate, usually broader than long, dark red-brown, margins entire, glabrous and scarious; lateral sepals linear-spathulate, smooth.....1. *indica*.
Leaves often twisted, rigid, pungently acute, 5-20 in. long, 1-2.5 in. wide, margined, margins usually minutely scabrid; scape longer, up to 38 in. long, flat and sharply 2-edged, edges minutely scabrid; heads ovoid or ellipsoid-

cylindric, 4—9 in. long; bracts orbicular, brown, margins minutely denticulate or ciliate; lateral sepals ovate-lanceolate, keel spinulose.....2. *complanata*. Comparatively slender herbs, 2·5—14 in. high, rarely up to 22 in. high; leaves very narrow, rarely as much as ·1 in. wide; scapes terete, not distinctly ribbed:— Leaves 2—9 in. long, ·03—·1 in., rarely up to ·17 in. wide, acute, often pungent, not papillose; scape usually much longer, striate, sometimes flattish and slightly 2-ribbed, up to 22 in. long; heads globose or ovoid, ·25—·3 in. long; bracts broadly oblong, obtuse, usually dorsally keeled towards the apex, dark-brown; lateral sepals oblanceolate, acuminate.....3. *schoenoides*. Leaves 2—9 in. long, ·03—·07 in. wide, acuminate, minutely papillose; scape as long or a little longer, rarely more than 12 in. long, finely striate, often minutely papillose; heads globose or ovoid, ·2—·5 in. long; bracts orbicular, shining, chestnut-brown, the margins yellowish-brown, apex usually with an acute green tip; lateral sepals oblanceolate, acuminate, keeled, hyaline...4. *pauciflora*.

1. XYRIS INDICA, Linn.; F. B. I. vi. 364.

In marshy localities on the W. Coast.

2. XYRIS COMPLANATA, R. Br. X. *anceps*, Hook. f. non Lam.; F. B. I. vi. 364.

In swampy localities, Quilon (Wight, Rama Row); Malabar-Wynaad at Muthanga, 2,600 ft. (Fischer).

3. XYRIS SCHOENOIDES, Mart.; F. B. I. vi. 365.

In marshy localities, W. Gháts, 4,000—7,000 ft.; Vizagapatam District at Ventala, 4,500 ft. (A. W. Lushington).

4. XYRIS PAUCIFLORA, Willd.; F. B. I. vi. 365.

In marshy localities in all Districts, sea-level to 2,000 ft.

FLORA
OF THE
PRESIDENCY OF MADRAS

J. S. GAMBLE

PART IX
COMMELINACEAE TO CYPERACEAE

BY
C. E. C. FISCHER
LATE OF THE INDIAN FOREST DEPARTMENT

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CALCUTTA

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INTRODUCTION TO PART IX.

THE present part has been reduced in length so as to close it with the *Cyperaceae*. A full part would have included the first quarter or so of the *Gramineae*, and this would have entailed considerable delay, as the key to the genera, which must find place at the beginning, can be compiled only when the whole family has been reviewed. For this reason it has been deemed advisable to divide the last two parts into three more or less equal ones, of which this is the first. The remaining ones will comprise the family *Gramineae*, the index and other appendices.

The Supplementary Note, dealing with points in Part VIII which required explanation, appeared as No. VI in the 'Kew Bulletin' for 1928, p. 281.

CECIL E. C. FISCHER.

ROYAL BOTANIC GARDENS, KEW :
January, 1931.

FLORA OF MADRAS.

Family CLXII. COMMELINACEAE.

Prostrate or erect herbs, rarely climbing, very rarely shrubby. *Leaves* alternate, with a strong midrib and many slender, parallel nerves, bases usually sheathing. *Inflorescence* various, often cymose and scorpioid, sometimes paniced. *Flowers* usually 2-sexual, more or less irregular, often enclosed in spathe-like bracts. *Perianth* inferior, 6-partite, 2-seriate; 3 outer segments herbaceous (*sepals*), often persistent, 3 inner petaloid (*petals*), free or united into a tube below, spreading above, marcescent. *Stamens* 6, adnate to the base of the perianth, all perfect or 2 or more reduced to staminodes; filaments often bearded with jointed hairs; anthers oblong or globose, often dissimilar. *Ovary* superior, 2—3-celled; ovules 1—several in the inner angle of each cell, orthotropous; style terminal, stigma small. *Fruit* a loculicidal capsule or indehiscent. *Seeds* angled; testa smooth or rugose; embryo minute; albumen floury.

- Fruit indehiscent, fragile, blue.....1. **Pollia**.
 Fruit loculicidally 2—3-valved:—
 Fertile stamens 3, staminodes 1—3:—
 Cymes 1—2, arising from a spathaceous bract.....2. **Commelina**.
 Cymes paniced, not arising from a spathaceous bract.....3. **Aneilema**,
 Fertile stamens 6, staminodes 0:—
 Cymes not paniced; capsules 3-celled:—
 Cymes scorpioid, formed by biseriata, foliaceous bracteoles.....4. **Cyanotis**.
 Cymes not scorpioid, not enclosed in biseriata bracteoles.....5. **Belosynapsis**.
 Cymes paniced; capsules 2-celled.....6. **Floscopa**.

1. **Pollia**, Thunb.

Large erect, sparsely branched herbs. *Leaves* lanceolate. *Cymes* in a terminal, sometimes also axillary, panicle. *Sepals* 3, free. *Petals* 3, free, smaller, subequal. *Stamens* 6 or 3 with 3 staminodes; filaments naked; anthers oblong, sterile anthers triangular-lanceolate-hastate. *Ovary* sessile, 3-celled; ovules 2—10 in each cell. *Fruit* globose or ovoid. *Seeds* 2-seriate, dorsally or laterally compressed, smooth; testa firm.

POLLIA SORZOGONENSIS, Endl. var. INDICA, C. B. Clarke; F. B. I. vi. 368.

Coorg (Hohenacker); S. Kanara (Meebold); Wynaad at 3,000 ft. (Gamble); Anamalai and Tinnevely Hills (Beddome) Godavari District at Ethakonda, 2,800 ft. (V. Narayanswami).

Stem, stout, viscid; leaves linear- or elliptic-lanceolate, caudate-acuminate, base narrowed or rounded, 3.75—10 in. long, 1.2—3 in. wide, puberulous when young, glabrescent; petioles of lower leaves up to .5 in. long, with loose puberulous sheaths up to 1.5 in. long, upper leaves practically sessile and sheathless; panicle

viscidly pubescent; bracts oblong persistent; petals white or pale pink; stamens 3 perfect; fruit globose, blue, .25 in. diam., cells many-seeded.

2. *Commelina*, Linn.

Herbs, usually slender and creeping below; sometimes tuberous. *Leaves* with usually lax sheaths, sessile or petioled. *Flowers* in usually 2-fid cymes emerging one at a time from a terminal complicate, cucullate or funnel-shaped spathiform bract, the flowers of the upper cyme usually small and deciduous, of the lower fertile; fruiting pedicels and capsules retracted within the bract. *Sepals* 3, membranous, the 2 inner often connate at the base. *Petals* 3, longer, 2 of them usually larger and long-clawed, the 3rd sometimes absent. *Stamens* 3 perfect and 2—3 imperfect; filaments filiform, often spirally coiled; anthers oblong, one usually larger than the rest, the imperfect often cruciform. *Ovary* 3- (rarely 2-) celled, 2 anticus cells 1—2 ovuled, the posticus, when present, 1-ovuled or empty. *Fruit* a loculicidal capsule, the posticus cell sometimes indehiscent, sometimes absent, or the 2 anticus cells empty, indehiscent and connate as a ligulate body from which the posticus falls away. *Seeds* cylindric, ellipsoid, subglobose or angled; testa smooth, rugose, reticulate, pitted or grooved.

The 2 anticus cells of the ovary 2-ovuled, the posticus 1-ovuled or obsolete:—

Spathes complicate, margins free or connate only at the very base:—

Capsules 3-celled:—

Posticus cell of the capsule keeled:—

Spathes sessile or nearly so, falcate, acute, base cordate, .25—4 in. long, pubescent, ciliate; seeds transversely grooved, puberulous, black. Stem erect, slender, 8—16 in. high; leaves linear, acute, 1—3 in. long, .1—1.5 in. wide; sheaths .5 in. long or less, margins glabrous or ciliate

1. *subulata*.

Spathes distinctly peduncled; seeds not grooved:—

Seed tuberculate and reticulate, oblong-cylindric, dark brown. Stem diffuse, subsucculent, 2—3 ft. high, sometimes more; leaves lanceolate or ovate-lanceolate, acute or acuminate, glabrous or puberulous, 1.25—3 in. long, .4—75 in. wide; sheaths loose, .75 in. or more long, glabrous, margins usually ciliate; peduncles .5—75 in. long; spathes ovate or ovate-lanceolate, acute or acuminate, base rounded or cordate, .75—1.3 in. long.....2. *nudiflora*.

Seeds smooth, truncate at one end:—

Branches of cymes equal, usually 1—2-flowered, flowers small, polygamous; seeds ovoid or subglobose, black powdered with white, with a whitish membranous appendage at one end. Stems slender, decumbent, internodes long; leaves linear to linear-lanceolate; spathes ovate or narrow-lanceolate, short and acute or acuminate or long and finely or subobtusely caudate-acuminate, base rounded, more or less cordate, sometimes strongly auriculate; .8—2.5 in. long; peduncles .3—2.2 in. long.....3. *salicifolia*.
Branches of cymes usually unequal, upper 2—4 lower usually 1—2-flowered; seeds cylindric, subacute or rounded at one end, not appendaged. Stem much-branched; leaves narrow-lanceolate, subacute, 1—3 in. long, .4—7 in. wide; sheaths .5 in. long, base broad, ciliate; peduncles .5—1.5 in. long; spathes ovate-lanceolate, base rounded and cordate, .5—1.3 in. long, glabrous, scabrid or hispid

4. *Hasskarltii*.

Posticus cell of capsule not keeled:—

Whole plant hirsute (rarely glabrescent); stems erect, usually branched from the base, 3—18 in. high, slender; leaves linear to linear-lanceolate, obtuse, acute or acuminate, peduncles .5—2 in. long; spathes lanceolate

or linear-lanceolate, acuminate, base shallowly cordate, nerves slightly curved, .6—1.6 in. long.....5. *hirsuta*.
 Glabrous or nearly so; stems erect or caespitose, branched, 5—20 in. high, slender; leaves linear to oblong, obtuse or acute, .6—3 in. long, .2—.5 in. wide; sheaths short, margins ciliate; peduncles slender, .5—3 in. long, usually scabrous-pubescent; spathes ovate-lanceolate, acuminate, base deeply cordate, nerves strongly arched, .5—.9 in. long, margins usually ciliate

6. *glabra*.

Capsules 2-celled, rarely the posticous cell present and empty or with an imperfect seed :—

Spathes broad, base not auricled :—

Leaves linear- to elliptic-lanceolate, acute or acuminate, base narrowed, 1.5—3 in. long, .5—.75 in. wide; sheaths .4—1 in. long, narrowed to the blade, usually hirsute at the mouth; peduncles .75—1.75 in. long; spathes ovate-lanceolate, acuminate, base rounded or cordate, .8—1.7 in. long; capsule slightly constricted at the middle, tip bicuspidate; seeds 4 (sometimes 2 wanting), reticulately pitted.....7. *clavata*.

Leaves ovate-lanceolate, acuminate, base rounded and then narrowed into a short petiole, 2—.5 in. long, .9—2 in. wide; sheaths .6—1 in. long, mouth usually minutely pubescent; peduncles .5—.75 in. long; spathes ovate, acute, base truncately rounded; .7—1 in. long, capsules oblong, obtuse; seeds obscurely undulate-rugose.....8. *persicariaefolia*.

Spathes narrowly ovate-lanceolate, acute or caudate-acuminate, base distinctly sagittate-auriculate, .5—1.6 in. long. Stem slender, .5—3 ft. long; leaves linear or linear-lanceolate, sometimes falcate, acute or subobtuse, 1—3 in. long, .12—.5 in. wide; peduncles slender, .3—1.5 in. long; flowers small; seeds pale with a white appendage at each end.....9. *attenuata*.

Spathes funnel-shaped or cucullate :—

Leaves ovate or ovate-lanceolate :—

Leaves ovate, oblong or suborbicular, obtuse or acute, base contracted into a petiole, often inequilateral, .75—3.6 in. long, .6—1.7 in. wide, pubescent or villous; petioles up to .5 in. long, rarely 0; sheaths short or long, like the petioles pubescent or villous and the margins strongly ciliate with rufous hairs. Stem 2—3 ft. long, branched, diffuse; peduncles very short or 0; spathes 1—3 together, auricled on one side, pubescent or hirsute, .4—.7 in. long; capsules pyriform; seeds closely pitted.....10. *benghalensis*.

Leaves ovate or ovate-lanceolate, acute or acuminate, base rounded or subcordate, sessile, 1—2.4 in. long, glabrous, margins often crisped; sheaths .4—.8 in. long, mouth minutely ciliate; peduncles .4—.6 in. long, sulcate and angled, thickened and puberulous at the apex; spathes ovate-falcate, acute, base rounded, .6—1 in. long, puberulous; capsules quadrate, margined, either 3-celled and 5-seeded or 2-celled and 4-seeded; seeds oblong, curved, with 4—7 transverse ridges.....11. *Jacobii*.

Leaves linear or linear-oblong, obtuse or subacute, narrowed at the base, 1—2 in. long, .25—.5 in. wide, margins usually undulate or crenulate. Stems diffuse, short or long; sheaths .3—.5 in. long, ciliate; peduncles .25—.4 in. long; spathes broadly ovate, acute, base usually truncate, sparsely hairy with long slender hairs, .4—.5 in. long; seeds orange-brown.....12. *Forskalaiei*.

All the cells of the ovary 1-ovuled :—

Capsules 3-celled :—

Capsules subequally 3-valved, seeds free in the cells :—

Spathes sessile or nearly so :—

Leaves lanceolate or elliptic-lanceolate, acute or caudate-acuminate, base narrowed, glabrous, scabrous or villous, 2.2—8 in. long, .6—2 in. wide, sessile or shortly petioled; sheaths up to 1 in. long, mouth bearded with long, sometimes rufous, hairs. Stem stout, 2—3 ft. high; spathes sessile, solitary or crowded in terminal heads, funnel-shaped, acute, .75—1 in. long, glabrous, subsabrid or glandular-hirsute with red hairs, usually filled with a clear glutinous fluid; capsules trigonous-obovoid; seeds oblong or ellipsoid, smooth, lead-coloured.....13. *obliqua*.

Leaves linear or linear-lanceolate, obtuse, acute or acuminate, base narrowed, sessile, glabrous or minutely puberulous, 2—6 in. long, .2—.5 in. wide. Stem slender, 9—24 in. high; sheaths .5—1 in. long, glabrous or

minutely puberulous, mouth glabrous or ciliate; spathes usually very shortly peduncled, cucullate, acute, base truncate, .6—8 in. long, pubescent and often setose.....14. *undulata* var. *setosa*.

Spathes distinctly peduncled, shortly cucullate, ovate, acute or acuminate, base broadly rhomboid, .75—1.3 in. long, scabridly pubescent; peduncles .3—8 in. long. Stem stout, branched; leaves elliptic to broadly lanceolate, acuminate, base usually cuneate, 2—6 in. long, 1—1.75 in. wide, glabrous or nearly so; capsules quadrate-oblong; seeds ellipsoid, dull black

15. *paleata*.

Capsules 2-valved; seeds adnate to the cells, broadly ellipsoid, ashy. Stem stout, 1—2 ft. high, hairy or glabrate; leaves narrowly lanceolate, acuminate, scaberulous, puberulous or hirsute, 2—6 in. long, .25—1 in. wide; sheaths .5—1 in. long, ciliate; spathes sessile or nearly so, solitary or clustered, cucullate, broadly cordate, acute, recurved, about .75 in. long and broad, glabrous or pubescent.....16. *Kurzii*.

Capsule 2-celled. Stem slender, up to 18 in. long; leaves linear to linear-lanceolate, acute or subobtuse, base narrowed, 1—3 in. long, .2—4 in. wide, glabrous or with deciduous hairs; sheaths .4—8 in. long, often rather inflated, glabrous or minutely puberulous; peduncles short; spathes cucullate, ovate, acute, truncate on one margin, hooked on the other, glabrous or hairy, .5—7 in. long; seeds ellipsoid, smooth.....17. *ensifolia*.

1. *COMMELINA SUBULATA*, Roth; F. B. I. vi. 369.

Hills of the Deccan; 3,000—4,000 ft.

Flowers orange-purple, drying violet.

2. *COMMELINA NUDIFLORA*, Linn.; F. B. I. vi. 369.

In all Districts, up to 4,500 ft.

Flowers blue, sometimes very pale.

3. *COMMELINA SALICIFOLIA*, Roxb.; F. B. I. vi. 370; Clarke Comm. Beng. t. 2.

N. Circars; W. Gháts; 100—7,000 ft.

Flowers dark-blue.

4. *COMMELINA HASSKARLII*, Clarke Comm. Beng. t. 3; F. B. I. vi. 370.

Deccan and W. Gháts at low elevations.

5. *COMMELINA HIRSUTA*, Clarke; F. B. I. vi. 371. *Heterocarpus hirsutus*, Wt. Ic. t. 2067.

Nilgiri and Pulney Hills; 6,000—8,000 ft.

Flowers yellow, drying deep-blue.

6. *COMMELINA GLABRA*, Clarke; F. B. I. vi. 371. *Heterocarpus glaber*, Wt. Ic. t. 2067.

In the Central Districts; 600—3,000 ft.

Flowers yellow.

7. *COMMELINA CLAVATA*, Clarke Comm. Beng. t. 5; F. B. I. vi. 371.

In all Districts; sea-level to 7,000 ft.

Flowers lilac.

Var. *Hohenackeri*, Clarke; F. B. I. vi. 371. Leaves oblong, sub-acute, spathes smaller, tip acuminate.

8. *COMMELINA PERSICARIAEFOLIA*, Wight; F. B. I. vi. 372.

Anamalais at 2,000 ft. (Fischer); Dindigul (Wight); Pulney Hills (Bourne, Saulière); Mangalore (Meebold).

9. *COMMELINA ATTENUATA*, Koen.; F. B. I. vi. 372.

E. Districts from the Nallamallais to Salem District, Mysore and Quilon. On sea-shore sands and up to 3,000 ft.

Flowers small, blue.

10. *COMMELINA BENGHALENSIS*, Linn.; F. B. I. vi. 370; Wt. Ic. t. 2065; Clarke Comm. Beng. t. 4.
In all Districts except in the wettest localities; sea-level to 4,000 ft.
Flowers blue. The lower nodes sometimes develop naked underground shoots bearing smaller white flowers which ripen large seeds underground, whereas perfect seeds are often not developed in the normal flowers. Vern. Tam. Adutinnathalai.
11. *COMMELINA JACOBII*, Fischer in Kew Bull. 1928, 277.
Salem District at Buddireddipatti (K. C. Jacob) and Coimbatore District at the Agricultural College farm (K. C. Jacob); about 1,300 ft.
Flowers blue.
12. *COMMELINA FORSKALAEI*, Vahl; F. B. I. vi. 371.
In dry tracts from Mysore to Cape Comorin.
Flowers blue.
13. *COMMELINA OBLIQUA*, Ham.; F. B. I. vi. 372; Clarke Comm. Beng. t. 9. *C. polyspatha*, Wt. Ic. t. 2066.
In all Districts, up to 3,000 ft.
Flowers blue.
14. *COMMELINA UNDULATA*, R. Br. *var. SETOSA*, Clarke; F. B. I. vi. 373.
E. Districts from Anantapur to Tinnevely and Travancore (M. Rama Rao); sea-level to 4,000 ft.
Flowers blue.
15. *COMMELINA PALEATA*, Hassk.; F. B. I. vi. 372.
Bababudans (Law); Coimbatore District at 600 ft. (Fischer); Pulneys at 1,600 ft. (Rodriguez); Courtallam.
Flowers blue.
16. *COMMELINA KURZII*, Clarke Comm. Beng. t. 8; F. B. I. vi. 373.
Deccan from Kurnool and Mysore to Coimbatore; 1,000—4,000 ft.
Flowers blue.
Var. glochidea, Clarke; F. B. I. vi. 374. Leaves elliptic-lanceolate, shorter, laxly pilose, scabrid or nearly glabrous.
17. *COMMELINA ENSIFOLIA*, R. Br.; F. B. I. vi. 374.
E. Districts from Bellary to Tinnevely; sea-level to 4,000 ft.

Commelina coelestis, Willd.; F. B. I. vi. 369, is an escape from cultivation round about Ootacamund, where it is becoming established. It is a stout plant 2—3 ft. high with large lanceolate, sessile leaves; peduncled, shortly cucullate spathes which are ovate- to rotund-lanceolate, 1—1.5 in. long and beautiful large deep-blue flowers.

3. *Aneilema*, R. Brown.

Herbs; roots often tuberous. Leaves usually alternate, sometimes all radical. Flowers in axillary and terminal panicles, seldom solitary or a few fascicled, bracteate and bracteolate, bracts not spathaceous. Sepals 3, free, membranous. Petals 3, free, subequal. Stamens 2 or 3 with perfect anthers; filaments naked or bearded; anthers oblong, one usually larger or smaller. Staminodes 2—4, rarely 0, with imperfect, rarely polliniferous, and minute, anthers. Ovary sessile, 2- or 3-celled;

ovules 1—2-many in each cell; style slender, naked or bearded; stigma minute. *Fruit* a loculicidal capsule. *Seeds* 1 or more in each cell; testa hard, rugose, pitted or smooth.

Cells of ovary 2-many-ovuled:—

Seeds 1-seriate in each cell:—

Cells of the ovary 3—many-ovuled; of the capsule 1—many-seeded:—

Flowers panicled on a radical or subradical, rarely leafy scape:—

Roots fibrous; leaves rosulate, broadly ensiform, acute or acuminate, 2—9 in. long, .6—1.6 in. wide, margins crisped; scape erect, branched from near its base, up to 9 in. long; panicle spreading, lax-flowered; bracts small, not sheathing.....1. *glaucum*.

Roots of fascicled, elongate tubers; leaves radical, linear-ensiform, acuminate, 2.5—10 in. long, .3—5 in. wide; scape erect, up to 20 in. long; panicle elongate, narrow; bracts large, sheathing.....2. *scapiflorum*.

Flowering stem leafy:—

Flowers corymbose or panicled:—

Leaves ovate-lanceolate or elliptic-oblong, acute or acuminate, base rounded or cordate, 4—6 in. (lower sometimes 12 in.) long, 1.2—2.3 in. wide, margins white, undulate. Root of slender tubers; stem 3—4 ft. high; panicles stout, dichotomously branched; capsule subglobose; seeds reticulate, glandular-pubescent.....3. *lineolatum*.
Leaves usually narrow, margins not white nor undulate; capsules narrowly ellipsoid:—

Leaves narrowly lanceolate, rarely ovate-lanceolate, acuminate, rarely acute, base cuneate, rounded or cordate, 2—9 in. long, .5—1.6 in. wide; sheaths .5—1.25 in. long; panicles terminal and from the 1 or 2 uppermost axils, sessile or nearly so; seeds not glandular

4. *zeylanicum* var. *longicapsa*.

Leaves .25—5 in. wide; sheaths .6 in. or less long; panicles on terminal peduncles:—

Stems erect; leaves narrowed or rounded at the base; mouth of sheath oblique:—

Roots tuberous; stems subsolitary; leaves linear, usually complicate, often recurved, obtuse or acute, 2—4 in. long, .25—4 in. wide; panicle spreading; bracts oblong or the lower 1 or 2 foliaceous; seeds subcubical, dark-brown, obscurely scabrid or pitted.....5. *esculentum*.

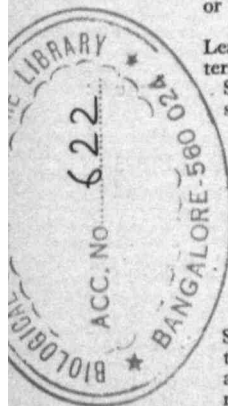
Roots fibrous; stems few-many, branching from the base; leaves linear-oblong to ovate-lanceolate, usually flat, acute or obtuse, 1—3 in. long, .3—5 in. wide; panicles sparingly dichotomously branched usually few-flowered; bracts ovate or orbicular, cucullate; seeds subcubical, dark-brown, minutely striate.....6. *dimorphum*.

Stems decumbent, usually dwarf; roots fibrous; leaves oblong, sometimes the lower narrowly lanceolate, acute, base cordate and amplexicaul, .5—1.5 in. long, .3—5 in. wide, ribbed when dry; mouth of sheath straight; panicles branched, few-flowered, terminal and from the upper axils; bracts minute, ovate, amplexicaul; seeds minute, angular or cubical, straw-coloured.....7. *spiratum*.

Cymes 1—3 (rarely 4- or 5-) flowered, axillary. Roots fibrous; stems decumbent and rooting at the nodes, villous on one side; leaves sessile, ovate, acute or subacute, base usually cordate, .5—2 in. long, .25—65 in. wide, more or less hairy; sheaths short, usually hairy; fruiting pedicels usually decurved; seeds cubical, black, nearly smooth.....8. *pauciflorum*.

Cells of the ovary 2- (rarely 3-) ovuled; of the capsule 2- (rarely 3-) seeded:—

Flowers in subglobose or subcorymbose cymes at the ends of the branches of the panicle; scars on the rhachis not or obscurely raised. Root fibrous; stem subsimple or branched from the base, branches usually weak and procumbent, often rooting at the nodes; leaves linear or linear lanceolate, acute or acuminate, base narrowed, rounded or cordate, 1.5—5 in. long, .25—5 in. wide; sheaths open, margins strongly ciliate; panicles terminal, rarely axillary.....9. *nudiflorum*.



Flowers in lax panicles; scars on the rhachis usually prominently raised:—
 Roots tuberous; stems 1–2 ft. high; leaves tufted at the base and a few
 cauline, linear, acute or acuminate, 3–12 in. long, .25–.6 in. wide;
 sheaths long, ciliate; bracts ovate, acute, membranous; fertile stamens 2;
 filaments bearded, twice as long as the 3 naked staminodes, rudimentary
 stamen bearded; seeds obscurely rugose.....10. *sinicum*.
 Roots fibrous; stems 1–3.5 ft. high; leaves linear, finely acuminate,
 striate, lowest 10–18 in., upper 2–5 in. long, .3–.6 in. wide; sheaths
 glabrous or villous with long hairs; bracts broadly ovate, acute, base
 cordate; fertile stamens 3; filaments bearded, as long as the 3 bearded
 staminodes, no rudimentary stamen; seeds rough or echinulate

11. *giganteum*.

Seeds 2-seriate in each cell:—

Flowers axillary, solitary or few clustered; pedicels jointed:—

Leaves oblong or ovate-oblong, acute or subobtusate, base cordate, subam-
 plexicaul, .5–1 in. long, .2–.5 in. wide, glabrous or nearly so. Stems 4–8
 in. long, rooting at the lower nodes, usually villous on one side, leafy;
 pedicels 1–7 together, .25–.75 in. long, jointed usually well below the
 middle, erect in fruit; capsules broadly oblong, obtuse, mucronate, .12–.16
 in. long; seeds angular, rugose, straw-coloured.....12. *ochraceum*.
 Leaves linear to linear-lanceolate, finely acuminate, base broad, 1–2.5 in.
 long, .2–.5 in. wide, pubescent, conspicuously striate, margins undulate.
 Stems erect, 6–16 in. long, pubescent, villous or nearly glabrous, leafy;
 pedicels 1–5 from the upper leaf-sheaths, .75–2 in. long, jointed at the
 middle, with 2 minute, scarious bracteoles at the joints, puberulous below
 the joint, glabrous above; capsules oblong-trigonal, long-cuspidate with
 the style, .25–.3 in. long; seeds angular, smooth or slightly pitted

13. *lanuginosum*.

Flowers terminal, paniced; pedicels not jointed:—

Stems much branched, 6–12 in. high; leaves linear to linear-lanceolate,
 obtuse or acute, base rounded or shallowly cordate, 1–3 in. long, .1–.25 in.
 wide; panicles much dichotomously branched, branches slender flexuous;
 bracts persistent, ochreate; filaments all bearded; capsules linear oblong,
 .17–.2 in. long; seeds 15–16 in each cell, minutely tessellate.....14. *Koenigii*.
 Stems tufted, 1.5–8 (rarely —12) in. high, sheathed at the base with broad,
 scarious sheaths; leaves filiform, narrowly linear or subulate-semiterete,
 acute and often apiculate, 1–6.5 in. long, up to .08, rarely .1, in. wide;
 panicles branched, spreading branches capillary, few-flowered; bracts minute,
 ochreate, apiculate; filaments all naked; capsules subglobose, .08–.12 in.
 long; seeds 6–8 in each cell, smooth.....15. *paniculatum*.

Cells of the ovary 1-ovuled; of the capsule 1-seeded or empty:—

Capsules glabrous; bracts not funnel-shaped:—

Leaves linear, sessile, acuminate, 1.5–8 in. long, .2–.4 in. wide; flowers
 solitary or 2–6 fascicled in the axils of persistent, usually distant, bracts.
 Root of stout, almost fleshy, fibres; stems 6–18 in. long, flaccid, often root-
 ing at the lower nodes; bracts narrowly oblong, obtuse, sheathing, strongly
 ribbed, .3–.6 in. long; pedicels slender, usually 2-jointed, with a scarious,
 sheathing bracteole at the lower or only joint; capsule globose, cuspidate,
 .15 in. long; seeds hemispheric, rugose.....16. *vaginatum*.

Leaves broad, petioled, aggregated and enlarging upwards; flowers in terminal
 panicles; bracts caducous:—

Panicles lax, peduncled, much exceeding the uppermost leaves; fruiting
 pedicels erect. Roots fibrous; stem stout, creeping and rooting, then erect,
 6–36 in. high; leaves elliptic-lanceolate, acuminate, base narrowed into a
 short petiole, glabrous or scaberulous, 2.5–7 in. long, .8–1.75 in. wide;
 sheaths .5–1.6 in. long, glabrous or puberulous, mouth usually ciliate;
 fertile stamens 3; capsule globose, .16 in. diam.; seeds hemispheric, rugose

17. *montanum*.

Panicles short, subsessile, pyramidal, much shorter than the uppermost
 leaves; fruiting pedicels decurved. Roots long fibrous; stem stout, erect,
 8–36 in. long; leaves broadly elliptic or elliptic-lanceolate, acuminate or
 caudate-acuminate, base narrowed into the petiole, puberulous or

glabrescent, 3—6·5 in. long, 1—2 in. wide; sheaths glabrous or pubescent, mouth usually ciliate, 6—1·3 in. long; fertile stamens 2; capsules globose, 2—2·5 in. diam.; seeds reticulate.....18. *ovalifolium*.

Capsules globose, pubescent, 12—15 in. long; bracts persistent, funnel-shaped. Roots fibrous; stem stout, 2—3 ft. high, puberulous, sometimes decumbent and rooting at the lower nodes; leaves scattered, usually distant, not enlarging upwards, lanceolate or oblong-lanceolate, acuminate, base rounded and then narrowed into a petiole, 3—7 in. long, 75—1·75 in. wide, hispid above, glabrous below; sheaths loose, 6—1·2 in. long, viscid or hispid, mouth long-ciliate; panicles with long, slender peduncles and branches; seeds plano-convex, glaucous, black, rugose.....19. *scaberrimum*.

1. *ANEILEMA GLAUCUM*, Thw.; F. B. I. vi. 375.
Travancore and Tinnevely Hills; 3,000—5,000 ft.
Flowers pale pinkish-violet.
2. *ANEILEMA SCAPIFLORUM*, Wt. Ic. t. 2073; F. B. I. vi. 375; Clarke Comm. Beng. t. 14.
Coorg (Heyne); Nilambur (Bourne); Cochin and Courtallam (Wight).
Flowers blue-mauve.
3. *ANEILEMA LINEOLATUM*, Kunth; F. B. I. vi. 376; Clarke Comm. Beng. t. 15. *A. latifolium*, Wt. Ic. t. 2072.
W. Gháts; 1,500—4,000 ft.
Flowers blue.
4. *ANEILEMA ZEYLANICUM*, Clarke *var.* *LONGICAPSA*, Clarke; F. B. I. vi. 376.
W. Gháts; 4,000—6,000 ft.
Flowers white.
5. *ANEILEMA ESCULENTUM*, Wall., F. B. I. vi. 377.
In rice-fields near Madras (Heyne, Wight).
6. *ANEILEMA DIMORPHUM*, Dalz.; F. B. I. vi. 377. *A. paniculata*, Wt. Ic. t. 2075.
In all Districts, on sea-shore sands and up to 7,500 ft.
Flowers blue or white.
7. *ANEILEMA SPIRATUM*, R. Br.; F. B. I. vi. 377. *A. nanum*, Kunth; Wt. Ic. t. 2077; Clarke Comm. Beng. t. 18.
In all Districts; sea-level to 5,000 ft.
Flowers blue to rose-brown.
8. *ANEILEMA PAUCHFLORUM*, Wt. Ic. t. 2077; F. B. I. vi. 378.
W. Coast and Gháts; near sea-level to 3,000 ft.
Flowers brownish-yellow, drying blue.
9. *ANEILEMA NUDIFLORUM*, R. Br.; F. B. I. vi. 378; Clarke Comm. Beng. t. 21.
In all Districts, sea-level to 4,000 ft.
Flowers blue or purplish.
Var. terminalis, Clarke; F. B. I. vi. 379. *A. terminalis*, Wt. Ic. t. 2076. More robust, leaves up to 8 in. long and 75 in. wide.
10. *ANEILEMA SINICUM*, Lindl.; F. B. I. vi. 379. *A. secundum*, Wt. Ic. t. 2075.
W. Gháts; 3,000—5,000 ft.
Flowers blue.

11. ANEILEMA GIGANTEUM, R. Br.; F. B. I. vi. 379. *A. ensifolium*, Wt. Ic. t. 2074; Clarke Comm. Beng. t. 22.
W. Gháts; 1,000—2,000 ft.
Flowers blue.
12. ANEILEMA OCHRACEUM, Dalz.; F. B. I. vi. 380. *Dichaespermum repens*, Wt. Ic. t. 2078, fig. 3.
Coorg (Bourne); S. Kanara (Hohenacker); Quilon in damp sandy soil (Wight).
Flowers brownish-yellow.
13. ANEILEMA LANUGINOSUM, Wall.; F. B. I. vi. 380.
Bababudan and Brahmagiri Hills (Beddome); Nilgiri Hills; 4,000—6,000 ft.
Flowers salmon-yellow, drying blue.
14. ANEILEMA KOENIGII, Wall. F. B. I. vi. 381. *Dichaespermum lanceolatum*, Wt. Ic. t. 2078, fig. 1.
Nilgiris? (Adam); Mangalore (Hohenacker); Quilon, Courtallam at 500 ft. and Palamkotta (Wight); Red Hills (G. Thomson).
Flowers blue.
15. ANEILEMA PANICULATUM, Wall.; F. B. I. vi. 381. *Dichaespermum juncoides*, Wt. Ic. t. 2078, fig. 2.
W. Coast and Gháts; near sea-level to 4,000 ft.
Flowers blue.
16. ANEILEMA VAGINATUM, R. Br.; F. B. I. vi. 381; Wt. Ic. t. 2076; Clarke Comm. Beng. t. 23.
Low-lying tracts on both coasts, often on sea-shore sands.
Flowers blue.
17. ANEILEMA MONTANUM, Wight; F. B. I. vi. 381. *Dictyospermum montanum*, Wt. Ic. t. 2069.
W. Gháts; 1,000—5,000 ft.
Flowers blue.
18. ANEILEMA OVALIFOLIUM, Hook. f.; F. B. I. vi. 382. *Dictyospermum ovalifolium*, Wt. Ic. t. 2070.
W. Gháts from Mysore to Travancore; 3,000—4,000 ft.
19. ANEILEMA SCABERRIMUM, Kunth; F. B. I. vi. 382. *A. protensum*, Wall.; Clarke Comm. Beng. t. 24. *Dictyospermum protensum*, Wt. Ic. t. 2071.
W. Gháts from Coorg to Travancore; 500—6,000 ft.; Rampa Hills at Sesharayi, 2,000 ft. (V. Narayanswami).
Flowers white.

4. Cyanotis, Don.

Prostrate, creeping or erect terrestrial herbs; roots sometimes tuberous. *Leaves* sheathing. *Flowers* in axillary or terminal, usually scorpioid, cymes formed by imbricate, biserial, secund, foliaceous bracteoles, usually the petals, stamens and style alone, rarely the whole flower, exposed. *Sepals* 3, subequal, free or connate below. *Petals* 3, subequal, often united into a tube below. *Stamens* 6, all perfect, subequal; filaments filiform, usually bearded, sometimes inflated towards the apex; anthers oblong. *Ovary* 3-celled; ovules 2 in each cell, collateral, one erect, the other pendulous; style linear, bearded or

naked, sometimes inflated below the apex; stigma minute, concave. *Fruit* a 3-celled, loculicidally 3-valved capsule. *Seeds* usually 2, casually 1 or 0, in each cell, superposed, cubical, cylindric or pyramidal, usually rugose or pitted.

Cymes not enclosed in the leaf-sheaths:—

Valves of the capsule separating from a free, central, columnar, 3-toothed axis. Stem 3—12 in. long, decumbent and often rooting at the nodes, usually patently hirsute, sometimes nearly glabrous, often reddish; leaves linear-lanceolate or -ensiform or -oblong, acute, acuminate or obtuse and apiculate, more or less hairy, .7—2.5 in. long, .1—4 in. wide; peduncles .5—3 in. long, usually patently hairy; bract falcate, usually slightly longer than the cyme; bracteoles .2—35 in. long, ovate, falcate, acute, ciliate; filaments bearded; capsules hairy at the apex.....1. *papilionacea*.

Capsule without a free, central column after dehiscence:—

Not cottony- or silky-cobwebby:—

Bract much exceeding (usually at least twice) the cyme. Stem 6—18 in. long, glabrous or with spreading hairs, internodes usually long; leaves ovate-oblong, obtuse or subacute, base rounded or cordate, glabrous or with spreading hairs, ciliate, 1—3.7 in. long, .25—8 in. wide; peduncles 0—5 in. long; bract leaf-like, acute or acuminate, up to 2.8 in. long; cyme usually much recurved; bracteoles ovate, usually broad, falcate, .5 in. long, often very numerous, glabrous or ciliate with long hairs; filaments bearded, apex inflated; capsules nearly glabrous; seeds black, striate, with 2 large pits on 2 of their faces.....2. *cristata*.

Bracts shorter than or equalling the cyme, rarely slightly longer:—

Root fibres usually tuberous; stem strongly hirsute at the collar, 6—36 in. long, densely villous or almost glabrous; leaves linear to broadly ensiform, acute or acuminate, often slightly narrowed to the base, silky-villous, often purple beneath, 3—18 in. long, .2—1 in. wide, radical usually much longer than cauline; cymes usually long-peduncled, villous or densely hirsute, rarely nearly glabrous; bract ovate, acute, shorter than the cyme; bracteoles .4—6 in. long, falcate, ciliate; filaments densely bearded, inflated at the apex; capsules hairy upwards; seeds pyramidal, brown, obscurely rugose.....3. *tuberosa*.

Root-fibres not tuberous; collar not prominently hirsute:—

Leaves glabrous or sparsely pilose below, linear to narrowly lanceolate, acute or acuminate, radical leaves 4—18 in. long, .4—1.5 in. wide, cauline smaller, margins ciliate; sheaths broad, loose, pilose. Stem 2—3 ft. high, softly villous or pilose; cymes subcorymbose, usually several together from a large, lanceolate, falcately deflexed leaf; bracts ovate-lanceolate, as long as the cyme; bracteoles ovate, falcate, acute or acuminate, .5—75 in. long, glabrous, ciliate, sepals fulvous pilose; filaments bearded; capsules hirsute at the apex; seeds pyramidal, pitted.....4. *pilosa*.

Leaves silky-villous below; sheaths moderately loose, pilose, sometimes lanate. Stems 3—4 ft. high, silky or villous with spreading hairs; leaves all cauline, narrowly lanceolate, acuminate, the smallest sometimes ovate and obtuse, 1—6 in. long, .4—1.2 in. wide, ciliate; cymes terminal and in the upper axils, often sessile, bracteoles semi-elliptic, falcate or nearly straight, acute or acuminate, .4—5 in. long, more or less silky-villous, usually densely ciliate; sepals fulvous pilose; filaments bearded; capsules pilose; seeds usually rugose.....5. *villosa*.

Cottony- or silky-cobwebby:—

Suberect; stems 6—24 in. high, slender or robust, often decumbent and rooting below, more or less cottony-cobwebby; leaves very variable, narrowly linear to oblong obtuse, acute or acuminate, 1—12 in. long, .2—1 in. wide, more or less cottony-cobwebby; cymes subsessile or peduncled, terminal and axillary, often large and dense; bract short, rarely as long as the cyme; bracteoles falcately lanceolate, acuminate, .3 in. long, silkily cobwebby; filaments bearded; capsules pilose; seeds narrowly cylindric, obscurely pitted.....6. *arachnoidea*.

Stem slender, decumbent, 2—12 in. high, floccosely silky- or woolly-cobwebby; leaves broadly ovate to narrowly linear, usually obtuse, sometimes apiculate, 4—3 in. long, 2—5 in. wide, more or less silky-cobwebby or floccose, sometimes silvery-silky; cymes axillary and terminal; peduncles slender, 25—125 in. long, solitary or several together; bract narrowly lanceolate, sharply acuminate, falcate, longer than the slender cyme; bracteoles narrowly ovate, falcate, acute or acuminate, 2—35 in. long, more or less cobwebby or floccose; filaments bearded; capsules pilose at the apex; seeds oblong, faintly rugose.....7. *fasciculata*.

Cymes enclosed in the leaf-sheaths:—

Stem stout or slender, leafy, glabrous, prostrate or suberect, 6—30 in. long; leaves linear, glabrous or sparsely hairy, 1.5—8 in. long, 1—4 in. wide; sheaths short, inflated, quite glabrous or mouth ciliate; cymes reduced to axillary fascicles; bracteoles linear lanceolate, almost hidden, glabrous or minutely ciliate; filaments densely bearded, inflated at the apex; capsules beaked, glabrous; seeds shortly cylindric, pitted.....8. *axillaris*. Filaments naked; capsules 3-horned at the apex which is depressed between the horns; seeds subquadrate, smooth or obscurely pitted. Otherwise not differing from the last species.....9. *cucullata*.

1. CYANOTIS PAPILIONACEA, Schult. f.; F. B. I. vi. 384; Wt. Ic. t. 2089.
On both coasts from Mangalore and Madras southwards;
Cuddapah, Anamalai and Pulney Hills; up to 3,000 ft.
Flowers blue, anthers violet.

Var. *vaginata*, Fischer n. comb. *C. vaginata*, Wt. Ic. t. 2088; F. B. I. vi. 385. Sheaths inflated; bracteoles transversely striate; seeds sub-tuberculately rugose.

2. CYANOTIS CRISTATA, Schult. f.; F. B. I. vi. 385; Wt. Ic. t. 2082;
Clarke Comm. Beng. t. 36.
In all Districts; near sea-level to 5,000 ft.
Flowers blue. Vern. Tel. Netha Kina.

3. CYANOTIS TUBEROSA, Schult. f.; F. B. I. vi. 386. *Tradescantia tuberosa*, Roxb. Cor. Pl. t. 108.
In all Districts from Kurnool southwards; near sea-level to 7,000 ft.
Flowers blue or bluish-purple.

Var. *adscendens*, Clarke; F. B. I. vi. 386. *C. sarmentosa*, Wt. Ic. t. 2087. Smaller, more glabrous; branches rooting and proliferous at the nodes.

Bolampatti (Wight).
Flowers pale-rose.

4. CYANOTIS PILOSA, Schult. f.; F. B. I. vi. 387. *C. Wightii*, Clarke;
F. B. I. vi. 386. *C. longifolia*, Wt. Ic. t. 2084.
W. Gháts; 4,000—7,000 ft.
Flowers blue.

5. CYANOTIS VILLOSA, Schult. f.; F. B. I. vi. 387. *C. lanceolata*, Wt. Ic. t. 2085.
W. Gháts; Shevaroy and Kollimalai Hills; 2,000—8,000 ft.
Flowers blue; stems and leaves often dark-purple.

6. CYANOTIS ARACHNOIDEA, Clarke; F. B. I. vi. 386. *C. pilosa*, Wt. Ic. t. 2083.
W. Gháts; Rampa, Shevaroy, Kollimalai, Sirumalai and Travancore Hills; 2,000—7,000 ft.
Flowers blue.

7. *CYANOTIS FASCICULATA*, Schult. f.; F. B. I. vi. 387; Wt. Ic. t. 2086.
C. rosea, Wt. Ic. t. 2086. *C. decumbens*, Wt. Ic. t. 2088.
 W. Gháts and all E. Districts; near sea-level to 6,000 ft.
 Flowers blue, purple or pink; beard of filaments often of two colours: blue and white.
 There are several not very well defined varieties, the most distinct being var. *glabrescens*, Clarke; F. B. I. vi. 388.
 Nearly glabrous; bracteoles woolly.
 Mysore State at Shimoga, 2,000—3,000 ft. (Meebold).
8. *CYANOTIS AXILLARIS*, Roem. & Sch.; F. B. I. vi. 388; Clarke Comm. Beng. t. 35. *Tradescantia axillaris*, Roxb. Cor. Pl. t. 107.
 In all Districts; near sea-level to 5,000 ft.
 Flowers blue or pink. Vern. *Tel.* Golla-gundi.
9. *CYANOTIS CUCULLATA*, Kunth; F. B. I. vi. 389.
 Bellary District.
 Flowers blue.

5. *Belosynapsis*, Hasskarl.

Prostrate or epiphytic herbs; roots fibrous; stem sometimes viviparous at the nodes. *Leaves* radical and cauline, sheathed, sometimes fleshy. *Flowers* small, terminal or subterminal, solitary or in few-flowered cymes; bracteoles 0. *Sepals* 3, subequal, free or very shortly united. *Petals* 3, subequal, free or united below. *Stamens* 6, all perfect; filaments bearded or naked; anthers oblong. *Ovary* 3-celled; ovules 2 in each cell, collateral, one erect, one pendulous; style filiform. *Fruit* a 3-celled, loculicidally 3-valved capsule. *Seeds* 2 in each cell, superposed, cylindric.

Prostrate on rocks; stems and branches thick, somewhat fleshy, 3—12 in. long, rooting at the nodes, densely hairy, hairs turning brown on drying; leaves radical and cauline, rather fleshy, densely villous and ciliate, radical rosulate, elliptic, acuminate, base narrowed, 1·5—2·2 in. long, ·5—·75 in. wide, cauline distichous, ovate or ovate-lanceolate, acute or acuminate, base usually cordately auriculate on one side, on erect shoots base usually equally rounded ·5—2 in. long, ·25—·75 in. wide, often bright red beneath, especially on the apical part; sheaths short, densely villous; flowers 4—8, racemed in pairs on a densely hairy peduncle, shortly pedicelled; bract short, hairy, elliptic-oblong; sepals with long, rufous hairs from bulbous bases; petals free; filaments bearded; capsules hairy; seeds subcubical or shortly cylindric, obscurely pitted.....1. *keuwensis*.
 Epiphytic, subscapigerous; flowering stems numerous, slender, 3—10 in. long, laxly pilose with rufous hairs, rooting below and viviparous at the apex; leaves radical and cauline, more or less pilose and ciliate with rufous hairs, radical linear or linear-lanceolate, acute or acuminate, base narrowed, 1—5 in. long, ·2—·4 in. wide, cauline ovate or elliptic, acute, ·2—·75 in. long; flowers in 2—4-flowered umbels on capillary, pilose peduncles, 2-bracteate; sepals villous; petals connate to the middle; filaments naked; capsules rufous-hairy; seeds cylindric, smooth.....2. *vivipara*.

1. *BELOSYNAPSIS KEUWENSIS*, Hassk. *Cyanotis keuwensis*, Clarke; F. B. I. vi. 388.
 Travancore on Myhendra Hill at 3,000 ft. (Beddome), "growing on rocks."
 Flowers blue or rose-purple with blue-hairy filaments.
2. *BELOSYNAPSIS VIVIPARA*, Fischer in Kew Bull. 1928, 254. *Cyanotis vivipara*, Dalz.; F. B. I. vi. 388.

Mysore at Manjerabad, 3,000 ft. (Meebold); Wynaad at 3,000 ft. (Lawson, Gamble); Anamalai Hills at 4,000 ft. (Beddome). Flowers white.

6. *Floscopa*, Loureiro.

Erect or subsucculent herbs. *Leaves* lanceolate. *Flowers* in terminal or axillary thyrsoid panicles, cymes secund, not scorpioid; bracts minute. *Sepals* 3, free, oblong. *Petals* 3, free, obovate. *Stamens* 6, all perfect, rarely 1 imperfect; filaments glabrous. *Ovary* 2-celled; ovules 1 in each cell; style simple. *Fruit* a loculicidal 2-celled, crustaceous capsule. *Seeds* hemispheric.

FLOSCOPA SCANDENS, LOUR.; F. B. I. vi. 390. *Tradescantia paniculata*, Roxb. Cor. Pl. t. 109. *Dithyrocarpus petiolatus*, Wt. Ic. t. 2079. *D. undulatus*, Wt. Ic. t. 2080. *D. Rothii*, Wt. Ic. t. 208. *D. paniculatus*, Kunth.; Clarke Comm. Beng. t. 34.

W. Ghâts, 500–3,000 ft.; Rampa Hills at Sesharayi, 2,000 ft. (Narayanaswami).

Stem rather slender, rooting below, glabrous or pubescent; leaves elliptic-lanceolate, acuminate, much narrowed to the base, 1.5–4 in. long, .5–1 in. wide, scaberulous above; sheaths short, glabrous or villous, mouth fringed with long hairs; flowers pedicelled, lilac or pink; filaments purplish; capsules suborbicular; seeds dorsally transversely wrinkled. Vern. *Tel.* Konda-amadikada.

Family CLXIII. JUNCACEAE.

Erect, usually perennial herbs; stems tufted; rootstock usually creeping. *Leaves* very narrow, flat or terete, or reduced to sheaths. *Flowers* usually small, regular, 2-sexual, in axillary or terminal bracteate cymes. *Perianth* in 2 whorls, whitish and membranous or brown and scarious or coriaceous. *Stamens* 6, seldom 3, hypogynous or on the bases of the perianth-segments; anthers basifixed. *Ovary* superior, 1-celled or more or less completely 3-celled by the intrusion of the placenta; style filiform or short or 0; stigmas 3, filiform; ovules 3, basal, or many superimposed on 3 placenta. *Fruit* a 1- or more or less 3-celled, loculicidally 3-valved capsule. *Seeds* 3 or many; testa membranous, sometimes produced at each end; albumen dense; embryo small, cylindric.

Sheaths of leaves split down one side; ovules and seeds many.....1. **Juncus**.
Sheaths of leaves entire; ovules and seeds 3.....2. **Luzula**.

1. *Juncus*, Linn.

Glabrous herbs. *Perianth* with the midrib of the 3 outer segments keeled or thickened. *Ovary* and capsule 3-, rarely 1-celled; ovules and seeds numerous.

Leaves reduced to sheaths; cyme one to a stem and lateral on it. Stems terete, striate, usually glaucous, up to 4 ft. high; cataphyls up to 4 in. long, usually mucronate, often reddish-brown; cymes up to 2 in. long and broad; flowers distinctly pedicelled.....1. *glaucus*.

Leaves developed; cymes several to a stem, not lateral:—

Leaves flat, very slender, concave above, not hollow nor septate within, 1–4 in.

long; stems densely clustered, 1—12 in. long; flowers solitary or in few-flowered clusters; stamens usually 6, but some terminal cleistogamous with 3 stamens; ovary and oblong or obovate capsule, 3-celled.....2. *bufonius*. Leaves terete or compressed, hollow and distantly septate within, 1—many-tubular, 2—10 in. long, .06—12 in. wide; stems terete or compressed, smooth, 3—26 in. high; cymes irregularly compound, in 6—10-flowered heads, stamens 3, ovary and prismatic or conical, trigonous capsule 1-celled.....3. *prismatocarpus*.

1. *JUNCUS GLAUCUS*, Ehrh.; F. B. I. vi. 393.
Nilgiri and Pulney Hills; 6,000—7,500 ft.
2. *JUNCUS BUFONIUS*, Linn.; F. B. I. vi. 392; Fyson, Fl. Nilg. & Puln. iii. t. 540.
Nilgiri Hills at about 6,500 ft. (Fyson).
3. *JUNCUS PRISMATOCARPUS*, R. Br.; F. B. I. vi. 395.
W. Gháts, 3,500—7,500 ft.; Kollimalai Hills (K. C. Jacob); High Wavy Mountains (Blatter and Hallberg).

2. *Luzula*, D.C.

More or less hairy herbs with grass-like leaves. *Perianth* glumaceous. *Capsule* 1-celled, loculicidally 3-valved. *Seeds* 3.

LUZULA CAMPESTRIS, D.C.; F. B. I. vi. 401.

Nilgiri and Pulney Hills; 7,000—8,000 ft.

An erect herb 5—18 in. high; leaves 1—15 in. long, .05—35 in. wide, usually densely ciliate; flowers in peduncled umbellate clusters of 6—10, sessile, bracts very short, scarious; capsule broadly oblong or subglobose, obtuse or mucronate.

Family CLXIV. PALMACEAE.

Shrubs or trees, sometimes climbing, rarely branched, often spiny. *Leaves* alternate, usually in a terminal crown, when mature usually palmate or pinnately divided, rarely simple or bipinnate; petiole sheathing. *Flowers* usually small, 1- or 2-sexual, monoecious or dioecious, sessile or sunk in the rachis of simple or branched spikes or panicles which are enclosed in 1-many sheathing spathes, ♂ and ♀ usually differing in form. *Perianth* of 6 segments in 2 whorls of 3, usually all free, dry or coriaceous, imbricate or valvate. *Stamens* 3, 6 or many. *Staminodes* often present in the ♀. *Ovary* superior, 1—3-celled or of 3 1-celled carpels; ovules 1—2 in each cell or carpel; stigmas 3, usually sessile. *Fruit* a 1—3-celled drupe or hard berry or of 1—3 carpels; pericarp smooth, rough or clothed in shining, downward-imbricating scales. *Seeds* erect or laterally attached; raphe usually branching all over the testa; albumen horny or bony, often ruminant; embryo small in a cavity near the surface of the albumen.

Stems not climbing by hooked spines; leaves in a terminal crown; fruit not scaly:—

Leaves compound:—

Leaves pinnate; leaflets linear or linear-lanceolate:—

None of the leaflets transformed into spines:—

Leaflets not auricled at the base:—

Apex of leaflets premorse; spadix inserted below the leaves:—

Stems 30—80 ft. high, over 6 in. diam.:—

Flowers not sunk in pits in the branches of the spadix, only ♀ flowers at the base.....1. *Areca*.

- Flowers sunk in pits in the branches of the spadix, both ♂ and ♀ flowers together at the base.....2. *Bentinckia*.
 Stems 15—25 ft. high, 2—3 in. diam.....3. *Pinanga*.
 Apex of leaflets acuminate, not premorse.....4. *Cocos*.
 Leaflets with two unequal auricles at the base.....5. *Arenga*.
 One or more of the lowest pairs of leaflets transformed into spines.....6. *Phoenix*.
 Leaves bipinnate; leaflets cuneate or fan-shaped.7. *Caryota*.
 Leaves simple, circular or lunate in outline:—
 Leaf-blades 8—16 ft. diam.; spadix terminal, erect, 10—20 ft. long; fruit 1.5 in. diam.....8. *Corypha*.
 Leaf-blades 2—5 ft. diam.; spadices from among the leaves, 1—5 ft. long; fruit 6 in. diam.....9. *Borassus*.
 Stems climbing by hooked spines; leaves scattered; fruit scaly.....10. *Calamus*.

1. *Areca*, Linn.

Stem tall, slender, annulate. *Spadices* from the axils of fallen leaves below the crown, branched. ♂ *flowers* minute, numerous on the upper parts. *Petals* obliquely lanceolate, valvate. ♀ *flowers* much larger, few, at the bases of the branches. *Perianth* accrescent, segments orbicular, imbricate, the inner with acute, valvate tips. *Ovary* 1-celled; ovule single, basal, erect. *Fruit* ovoid or oblong. *Seed* truncate at the base; albumen ruminant; embryo basilar.

ARECA CATECHU, Linn.; F. B. I. vi. 405; Roxb. Cor. Pl. t. 75.

Cultivated in many localities; not known truly wild. The *Areca*-or *Betul-nut Palm*.

A graceful tree reaching 100 ft. high, rarely over 1 ft. diam.; stem annulate with raised rings; leaves 4—6 ft. long, leaflets numerous, 1—2 ft. long, the upper confluent; spadix much branched; fruit 1.5—2 in. long, smooth, orange or scarlet. The seed is the well-known masticatory and is used in medicine. Vern. *Hind.* and *Ur.* *Supāri*; *Tel.* *Poka-vakka*; *Tam.* *Kamugu*, *Pakku*; *Mal.* *Adakka*, *Kavugu*; *Kan.* *Adike*.

2. *Bentinckia*, Berry

Stem slender, annulate. *Leaves* with the upper leaflets sometimes confluent. *Spadices* from the axils of fallen leaves below the crown, branched. *Spathes* many, the 2 lower short, incomplete, the upper 2-fid. *Flowers* minute, sunk in spirally arranged pits in the branches, 1, 2 or 3 together, the ♂ above and ♂ and ♀ together below, bracts forming a 2-lipped vertical mouth to each pit, bracteoles 2. ♂ *flowers* glumaceous. *Sepals* imbricate, connate below. *Petals* longer, valvate, connate into a stipes. *Stamens* 6. *Pistillode* conical. ♀ *flowers* large, ovoid. *Sepals* imbricate. *Petals* longer, valvate. *Staminodes* 6, minute. *Ovary* 3-celled; 1 ovule only developed. *Fruit* subspherical. *Seed* solitary, pendulous from the top of the cavity, sinuately grooved or ridged; albumen not ruminant.

BENTINCKIA CODDAPANNA, Berry; F. B. I. vi. 418.

Tinnevely and Travancore Hills; 2,500—6,000 ft.; abundant in its restricted locality. The *Hill Areca-nut*.

Stem smooth, grey, attaining 60 ft. high and 1 ft. diam.; leaves 3—5 ft. long; leaflets opposite, 2—2.5 ft. long, 1—1.5 in. wide, ribbed,

the ribs sometimes with a few paleæ; spadix 2 ft. long, 3 ft. wide, much branched, purple; ♂ flowers 12 in. diam., ♀ rather larger, opening after the fall of the ♂; fruit ovate-globose; 5–65 in. diam., bright-chocolate. Wood grey, not used. The terminal bud is edible. Vern. *Tam.* Varei-kamugu; *Mal.* Kanthal, Kanthakamugu.

(This description and the information is mainly from Mr. T. F. Bourdillon's careful M.S. notes in the Kew Herbarium.)

3. *Pinanga*, Blume.

Stem rather short, slender, annulate. *Leaves* with the upper leaflets confluent. *Spadices* from the axils of fallen leaves below the crown. *Spathes* solitary. *Flowers* monoecious, 3 together, a ♀ between two ♂, the clusters in 2, 4 or 6 series. ♂ *flowers* obliquely triquetrous. *Sepals* keeled, not imbricate. *Petals* ovate or lanceolate, valvate. *Stamens* 6—many; anthers subsessile, basifixed. ♀ *flowers* much smaller, ovoid or globose. *Sepals* and *petals* orbicular, imbricate. *Staminodes* often present. *Ovary* 1-celled; ovule solitary, basilar. *Fruit* ovoid or ellipsoid; pericarp fibrous. *Seed* ovoid or ellipsoid; albumen ruminant; embryo basilar.

PINANGA DICKSONII, BL.; F. B. I. vi. 409.

Western Ghâts; 1,000—3,000 ft.

Stem smooth, green, up to 25 ft. high and 3 in. diam.; leaves 3–5 ft. long, leaflets 1–2 ft. long, 1 in. wide, premorse; spadix with 4–8 branches clothed with imbricating flowers; ♂ flowers with tapering petals; stamens 20–30; pistillode 0; ♀ flowers with reniform perianth-segments, staminodes 6, clavate, tips penicillate; fruit ellipsoid, 5–8 in. long, 35 in. diam. The fruit are sometimes used by the poor as a substitute for Betel-nut. Vern. *Mal.* Kanakamugu.

4. *Cocos*, Linn.

Stem tall, slender. *Leaves* pinnatisect; leaflets narrow. *Spadices* erect at first, later drooping, simply paniced; branches bearing scattered ♀ flowers, often between 2 ♂, towards their bases and ♂ only above. *Spathes* 2 or more, lower short, upper fusiform or clavate. ♂ *flowers* small. *Sepals* and *petals* valvate. *Stamens* 6, filaments subulate; anthers linear, erect. *Pistillode* minute or 0. ♀ *flowers* usually much larger, ovoid. *Perianth* greatly accrescent. *Sepals* 3, imbricate. *Petals* 3, shorter, convolute with imbricate tips. *Disc* annular or 0. *Ovary* 3-celled; ovule 1 in each cell; style short; stigmas 3, recurved. *Fruit* large, ovoid, terete or trigonous, 1-seeded; pericarp thick, fibrous; endocarp bony or stony with 3 basal pores. *Seed* cohering with the endocarp; albumen solid or hollow or lining the endocarp, not ruminant; embryo opposite one of the pores.

COCUS NUCIFERA, Linn.; F. B. I. vi. 482; Roxb. Cor. Pl. t. 73.

Much cultivated, especially along the coasts. Country of origin disputed. The Coconut Palm.

Stem slender, curved or straight, 40–80 ft. high, marked with ring-like leaf-scars; leaves 6–15 ft. long, leaflets numerous,

linear-lanceolate, 2—3 ft. long; petioles 3—5 ft. long, stout; spadix 4—6 ft. long; lower spathes 2—3 ft. long; fruit green or yellowish, 8—12 in. long, the cavity containing a potable milky fluid. Wood hard, red outside, reddish-brown and softer within, used for rafters. The leaves are plaited into mats and used for thatching, fencing, partitions, etc. Toddy is obtained by tapping the peduncles and is convertible into arrack and "jageri." The kernel of the fruit is edible and yields an edible and burning oil. The fibres of the pericarp are used for cordage and matting. Vern. *Hind.* Nariyal; *Ur.* Nodia; *Tel.* Kobari, Tenkai; *Tam.* Tenga, Thennei; *Mal.* Tenga; *Kan.* Tengina.

5. *Arenga*, Labill.

Stem stout, densely clothed above with the black fibrous remains of the leaf-sheaths. *Spadices* first from an upper leaf-axil and successively from lower ones, large, much branched; peduncle decurved, clothed by numerous imbricating spathes. *Flowers* monoecious, the sexes usually on separate spadices, rarely a ♀ between 2 ♂. ♂ *sepals* orbicular imbricate. *Petals* oblong, valvate. *Stamens* numerous. ♀ *flower* subglobose. *Sepals* accrescent. *Petals* triangular, valvate. *Staminodes* many or 0. *Ovary* globose, 3-celled; ovule 1 in each cell; stigmas conic. *Fruit* ovoid-globose, 2—3-seeded. *Seeds* compressed or plano-convex; albumen not ruminant; embryo dorsal.

ARENGA WIGHTII, Griff.; *F. B. I.* vi. 422.

W. Ghâts; 500—3,000 ft. The Wild Cocoanut.

Stem smooth, grey, up to 30 ft. high and 1 ft. diam.; leaves 12—28 ft. long, leaflets dark green above, white beneath, linear-ensiform, the apical often confluent and obconic, 1—3.5 ft. long, .75—2 in. wide, apex narrowed, sometimes shortly, unequally 2-lobed, entire or toothed in the upper half, base 2-auricled, the lower lobe up to 2 in. long, obliquely overlying the midrib, the upper shorter; petiole 4—8 ft. long, ♂ and ♀ spadices separate, up to 4 ft. long; fruit depressed-globose, 1 in. long, 1.5 in. wide. Toddy is obtained by the hill-men by tapping the peduncle. Vern. *Tam.* Alam panei; *Mal.* Alathil tenga, Malam tengu.

6. *Phoenix*, Linn.

Low shrubs or trees up to 60 ft. high, dioecious; stems clothed completely or at least above with the persistent bases of the petioles, rarely branched. *Leaves* pinnate; leaflets linear, longitudinally folded and attached obliquely by their folded bases to the rachis, the lower ones usually transformed into spines. *Spadices* from the axils of the leaves, usually several, branched. *Spathes* simple, basilar, coriaceous. ♂ *calyx* cupular, 3-toothed. *Petals* 3, obliquely ovate, valvate. *Stamens* usually 6. *Pistillode* minute or 0. ♀ *flowers* globose. *Calyx* as in the ♂, accrescent. *Petals* rounded, imbricate, *Staminodes* 6, sometimes united into a 6-toothed cup. *Ovary* of 3 free carpels; ovule 1 in each, erect; stigmas sessile, uncinat. *Fruit* oblong, terete; pericarp fleshy. *Seed* oblong, ventrally grooved; albumen not or only slightly ruminant; embryo dorsal or subbasilar.

Stem 10—50 ft. high:—

Stem slender, 25—50 ft. high, clothed with the large persistent bases of the petioles; leaves 7—15 ft. long; leaflets fascicled, 2—4-farious, rigid, 6—18 in. long, .75—1 in. wide, a few at the base forming channelled triangular spines up to 4 in. long; spathes 12—16 in. long, almost woody, scurfy, separating into 2 boat-shaped valves; ♂ flowers .25—.35 in. long, dense; ♀ smaller, distant; fruiting spadix 3 ft. long, much compressed, golden-orange; fruit oblong-ellipsoid, 1—1.25 in. long, orange-yellow.....1. *sylvestris*.

Stem stout, 10—20 ft. high, about 15 in. diam., clothed and appearing tessellated by the small, spirally-arranged leaf-sheaths; leaves 3—5 ft. long; leaflets fascicled, 4-farious, strict, shining, up to 12 in. long and .6 in. wide, a few basal forming channelled spines up to 3.5 in. long; spathes narrow, coriaceous, up to 8 in. long, fringed with brown wool on the keel; ♂ flowers .15—.2 in. long, dense; ♀ distant; fruiting spadix about 2 ft. long; fruit oblong-ellipsoid, .4—.5 in. long, brown.....2. *robusta*.

Stem .5—10 ft. high:—

Stem very short, thickly clothed and hidden by the old leaf-sheaths; leaves 3—5 ft. long, leaflets fascicled, more or less 4-farious, rigid shining, usually with an orange-red pulvinus at the junction with the rhachis, 3—8 in. long, .4—.6 in. wide, several basal forming stout flat spines 2—3 in. long; fruit .5—.75 in. long, at first green, black when ripe.....3. *farinifera*.

Stem usually well-developed, up to 10 ft. high, and 9 in. diam., densely covered with the bases of the petioles; leaves 4—8 ft. long, leaflets 8—20 in. long, .3—.75 in. wide, pliable, fascicled, more or less 4-farious, not or hardly pulvinate at the insertion, a number of the lowest forming channelled spines 1—3 in. long; spathes 8 in. long, fringed on the margins; spadix much branched, in fruit 3—4 ft. long; ♂ flowers .2—.25 in. long; fruit .5—.6 in. long, at first orange, black when ripe.....4. *humilis* var. *pedunculata*.

1. PHOENIX SYLVESTRIS, Roxb.; F. B. I. vi. 425.

In all the drier Districts, cultivated and run wild; from sea-level to 3,500 ft.; often in dense thickets. The Wild Date-Palm.

The fruit is edible. The stem is much tapped for toddy. The leaves are plaited into mats. Vern. *Hind.* Khajur; *Ur.* Khejuri, Kojari; *Tel.* Pedda-ita; *Tam.* Icham; *Kan.* Ichal.

2. PHOENIX ROBUSTA, Hook. f.; F. B. I. vi. 427.

Ganjam District (Gamble), Ventala in the Vizagapatam District (A. W. Lushington), 300—5,000 ft.

3. PHOENIX FARINIFERA, Roxb. Cor. Pl. t. 74; F. B. I. vi. 426.

Coromandel, at low elevations not far from the sea.

The pulp of the fruit is sweet and mealy. The leaflets are woven into mats and the split petioles into baskets. The farinaceous pith is used by the poor for "kanji." Vern. *Tel.* Chittisita, Chiruta-ita; *Tam.* Ithi.

4. PHOENIX HUMILIS, Royle var. PEDUNCULATA, Becc.; F. B. I. vi. 427.

In all the hilly Districts; 500—7,000 ft.

The fruit is sweet and edible. The leaves are plaited into mats. Vern. *Ur.* Bukhorjuro, Kojiri; *Tel.* Konda-ita; *Tam.* Inji, Malai-icham.

7. Caryota, Linn.

Stem tall, annulate, naked or sheathed. Leaves few, very large, bipinnate; leaflets obliquely cuneate or fan-shaped, premorse or rounded at the apical margin. Spadices first from the upper leaf-sheaths and successively from lower ones, shortly peduncled, much

branched; branches slender, pendulous. *Spathes* 3—5. *Flowers* monoecious, solitary and ♂ or in groups of one ♀ between 2 ♂. ♂ *sepals* rounded imbricate. *Petals* linear-oblong, valvate. *Stamens* very many. ♀ *flowers* subglobose. *Sepals* as in the ♂. *Petals* rounded, valvate. *Staminodes* 6, 3 or 0. *Ovary* 3-celled; ovule 1 in each cell, erect. *Fruit* globose, 1—2-seeded. *Seeds* erect; albumen ruminant; embryo small.

CARYOTA URENS, Linn.; F. B. I. vi. 422.

In all Districts; from sea-level to 4,000 ft., scattered; sometimes cultivated. The Bastard Sago or Kitul Palm.

Stem up to 60 ft. high and 1.5 ft. diam., smooth, shining; leaves 18—20 ft. long, 10—12 ft. wide; pinnae 5—6 ft. long, curved, drooping; leaflets 4—8 in. long, broadly cuneate, obliquely truncate or rounded and serrate on the apical margin, the outer angle often caudate; spadix 10—12 ft. long; spathes 1.5 ft. long; flowers ternate, ♂ .5 in. long, ♀ longer; fruit globose, .6—75 in. long, reddish.

Wood brown with close black streaks, very hard, strong and durable; used for hut-building, agricultural implements and fencing. The fibre of the petioles is used for fishing-lines. The pith makes a good sago. Toddy, convertible into arrack, is obtained by tapping the peduncles. *Vern. Hind. Mari; Ur. Solopo; Tel. Mari, Kondajivalaggu; Tam. Konda-panei, Thippili-panei; Mal. Iram-panei, Chunda-pana, kala-pana; Kan. Baini.*

8. *Corypha*, Linn.

Stem tall, stout, dying after once flowering and fruiting. *Leaves* very large, circular or lunate in outline, flabellately multifid round the margin, the segments folded lengthwise; petioles stout, concave, spinous at the edges. *Spadix* large, terminal, erect, paniculate, pyramidal. *Spathes* many, tubular. *Flowers* small, bisexual. *Calyx* cupular, 3-fid. *Petals* 3, connate at the base, ovate, acute, imbricate or subvalvate. *Stamens* 6; filaments subulate; anthers dorsifixed. *Ovary* 3-lobed, 3-celled; ovule 1 in each cell, basilar erect; style short, stigma minute. *Fruit* of 1—3 fleshy, globose drupes with basilar style. *Seeds* globose or oblong, erect; albumen not ruminant; embryo spiral.

CORYPIA UMBRACULIFERA, Linn.; F. B. I. vi. 428.

Malabar; Travancore; doubtfully wild. The Talipot Palm.

Stem 30—80 ft. high, 2—3 ft. diam., annulate; leaves circular or sublunate, 8—16 ft. diam., cleft to the middle into 80—100 linear-lanceolate, acute or 2-fid lobes; petioles 5—10 ft. long, very stout, margins armed with short, compressed dark spines; spadix 10—20 ft. long; spathes pierced by the primary branches of the spadix; fruit globose, 1.5 in. diam., usually only 1 carpel developed with 2 abortive ones at its base; seeds smooth, polished, very hard.

Wood soft with a hard rind; not used. The leaves used for thatching. The pith is used for flour. A very ornamental tree, flowering, fruiting and then dying at about 40 years of age. *Vern. Mal. Kodapana.*

9. *Borassus*, Linn.

Stem tall, stout. *Leaves* simple, palmately fan-shaped, plicate, the margin multifid; petioles spinous. *Spadices* dioecious, large, simply branched; peduncles sheathed with open spathes. ♂ *flowers* small, mixed with scaly bracts, secund in 2 series in a small spikelet. *Sepals* 3, narrowly cuneate, imbricate. *Petals* 3, shorter, obovate-spathulate, imbricate. *Stamens* 6; anthers subsessile. *Pistillode* of 3 bristles. ♀ *flowers* larger, globose. *Perianth* fleshy, accrescent. *Sepals* reniform, imbricate. *Petals* smaller, convolute. *Staminodes* 6—9. *Ovary* globose, subtrigonus, entire or 3—4-partite, 3—4-celled; ovules basilar, erect; stigmas 3, sessile, recurved. *Fruit* a large subglobose drupe with 1—3 fibrous pyrenes; pericarp thinly fleshy. *Seed* oblong, top 3-lobed; testa adhering to the pyrene; albumen hollow, not ruminant; embryo subapical.

BORASSUS FLABELLIFER, Linn.; F. B. I. vi. 482. *B. flabelliformis*, Linn.; Roxb. Cor. Pl. tt. 71 and 72.

In most Districts, wild or cultivated; sea-level to 2,500 ft.

The Palmyra Palm.

Stem up to 100 ft. high and 3 ft. diam., greyish-black, swollen above the middle and again contracted above, when young clothed with the dry leaves or the bases of the petioles; leaves 2—5 ft. diam., approximately circular, the margins split into 60—80 linear-lanceolate, acuminate segments with spinulose margins; petioles 2—4 ft. long, stout, semiterete, the edges armed with hard, horny, spinescent serratures; ♂ *spadix* simply branched, ♀ simple; fruit 6—8 in. diam., seated on the greatly enlarged perianth.

Outer wood hard black, inner soft, light brown, handsomely streaked; much used for rafters, posts and fences, water pipes, troughs, etc. The leaves are used for thatch, fans, hats, basket work, etc. The pulp of the fruit is edible. The sap of the peduncle yields a toddy which is fermented into arrack or boiled down into "jageri." Vern. *Hind.* Tal, Tar; *Ur.* Talo; *Tel.* Tadu, Tadi; *Tam.* and *Mal.* Panei, Karrumpanei; *Kan.* Tali.

10. *Calamus*, Linn.

Scandent, occasionally erect, tufted shrubs armed with spines or prickles. *Leaves* pinnatisect, the rhachis often produced into a whip-like cirrus armed with claws; petiole and rhachis armed with spines or prickles; sheathes armed, produced into long or short ligules or ochrea and often bearing a lateral flagellum armed with claws; leaflets evenly or unevenly spaced along the rhachis, often varying in arrangement in different parts of the plant and of the rhachis in the same leaf. *Spadices* axillary, usually elongate and much branched, often produced into a flagellum armed with claws. *Spathes* tubular or open, sheathing the peduncle and the branches of the spadix and passing into bracts and bracteoles (*spathels* and *spathellules*). *Flowers* small, polygamodioecious, usually in distichous, often scorpioid spikelets, solitary or binate (♂, ♀ or both) in the bracteoles. *Calyx* cupular, 3-toothed.

Petals 3, usually free in ♂ and tubular below in ♀, valvate. *Stamens* 6, shortly connate at the base. *Staminodes* in ♀ forming a cup with 6 short teeth with abortive anthers. *Ovary* incompletely 3-celled, clothed with retrorse scales; ovules 3, basal, erect; style short or long; stigmas 3. *Fruit* globose or ellipsoid, style terminal; pericarp thin, clothed with appressed, closely imbricating, polished scales. *Seed* solitary, rarely 2—3 developed, subglobose or oblong; albumen sometimes ruminant; embryo ventral or basal.

(The parts differ in young and adult plants; the key applies only to adult forms. In some species some of the parts are unknown, the key, therefore, is tentative.)

Leaf not ending in a cirrus; sheaths usually flagelliferous; leaflets usually narrowly-linear or lanceolate:—

Leaflets fascicled at least near the base:—

Leaflets not fascicled in threes, very narrow; secondary spathes closely sheathing, not strongly clawed nor 2-keeled:—

Petioles with flat, black, seriate spines; basal part of rhachis channelled above, trigonous upwards, the flat lower surface armed throughout with solitary or ternate reflexed, straight spines; leaflets in opposite or nearly opposite distant groups of 2 or 3 on each side in the basal part, often more or less regular and equidistant upwards, narrowly lanceolate or ensiform, up to 28 in. long and 2 in. wide, with a few short, black bristles on the ribs on both surfaces, the margins ciliate throughout with similar bristles; primary spathes very long, tubular, armed with short black-tipped prickles; fruit obovoid, suddenly beaked, .75—1 in. long, scales broad, channelled in the middle, yellowish-brown with a dark brown margin.....1. *Thwaitesii* var. *canarana*.

Spines on the petioles not flat and black:—

Leaflets numerous in several planes pointing in different directions, distinctly grouped in fascicles of 2—4 (seldom of 5—6) on each side, those near the apex more regular, nearly equidistant and in one plane, narrowly lanceolate, up to 11 in. long and .8 in. wide, densely bristly on the margins and on the midrib above; rhachis nearly terete, armed below with solitary or ternate, needle-like, pale, spreading or deflexed spines up to 1.25 in. long; primary spathes tubular, clawed mainly on the back; fruit globose or slightly turbinate, distinctly beaked, .4 in. long, scales broad, not channelled, uniformly pale-straw coloured.....2. *viminalis* var. *fasciculata*.

Leaflets all in one plane, not numerous (not more than 35):—

Primary spathes coriaceous, not produced above the insertion of the partial inflorescence, closely sheathing, not expanded, smooth or sparingly spinous, with a lanceolate point at the apex, mouth bearded. Leaf-sheath densely armed with scattered, slender, needle-like spines from subtuberculiform bases, mouth very short, ochrea with numerous spiculae up to 2 in. long; rhachis acutely trigonous, at least near the base, armed below with a few very strong, solitary, pale spines; leaflets few, sometimes only 15, very distinctly fascicled, narrowly elongate-lanceolate, apex acuminate and bristle-spinous, sparingly bristly above, densely so on the margins, up to 11 in. long and 1 in. wide; fruit nearly globose, slightly turbinate, .3 in. long including the sudden beak, scales semi-circular, not channelled, pale-brown with a broad submarginal dark brown band.....3. *Brandisii*.

Primary spathes membranous, much longer than the partial inflorescence, loose and expanded flatly at least in the middle, the margins spinulose near the base; rhachis trigonous, the flat lower face bearing irregular weak claws; leaflets 20—30, distinctly grouped into 3—4 opposite fascicles 3—4 in. apart, each of 3—5 close-set leaflets, very narrowly oblanceolate, tip filamentous and shortly bristly on the margin, up to 8 in. long and .7 in. wide, more or less bristly on the ribs above and densely along the margins; fruit unknown.....4. *travancoricus*.

Leaflets in distant fascicles of 3, 2 opposed to 1, near the base of the leaf, upwards becoming regular in opposite distant pairs, elongate-lanceolate, apex acuminate, bristly penicillate, up to 20 in. long and 4 in. wide, ribs 5—7, the middle one hardly more prominent, without bristles or cilia; secondary spathes coriaceous, loose and widened at the mouth, flattened on one side near the base and strongly 2-keeled, armed with strong claws all round a little below the mouth; spathels usually armed with 1—3 claws; fruit ovoid or ellipsoid, .8 in. long including a rather long, stout beak and .4 in. wide, perianth pedicelliform, .15 in. long, scales narrowly triangular, faintly keeled along the middle, pale brown, slightly paler near the base.....5. *Rheedei*.
 Leaflets not fascicled, more or less regularly equidistant:—

♀ spikelets inserted within their spathes:—

Rhachis of leaf trigonous, armed below in its lower half with straight, needle-like spines pointing in different directions; ochrea of leaf very large, usually over 4 in. long; leaflets linear-lanceolate, up to 20 in. long and .8 in. wide, apex usually bristly-penicillate, more or less bristly on the 3 ribs above, the margins very bristly-ciliate or almost smooth; primary spathes long, closely sheathing, the lowest flattened and acutely 2-edged, armed with scattered, straight, horizontal, usually short spines; fruit subovoid, .5 in. long including the sudden beak, scales broadly triangular, not channelled, orange-yellow with a broad chestnut submarginal band, their margins and apex pale and erose

6. *pseudo-tenuis*.

Rhachis of leaf trigonous in the upper part, terete or semi-terete in the basal half, armed with small, solitary, though often approximated, claws; leaflets numerous, rather distant, elongate-ensiform near the apex, lower ones lanceolate, up to 28 in. long and 3 in. wide, tapering into a long acuminate bristle-ciliate tip, with 3 or 5 distinct ribs which are remotely brown-bristly on both surfaces, margins remotely spinous-ciliate; secondary spathes unarmed; fruiting perianth pedicelliform; fruit globose, obpyriform or turbinate-globose, slightly tapering to a caudiculate base, apex flatish and mucronulate, about 1 in. long; scales broadly and rather acutely triangular, rather deeply channelled, shining, pale yellow with a narrow marginal dark line.....7. *Gamblei*.

♀ spikelets inserted at or well above the mouths of their spathes:—

Leaf-sheath and its spines glabrous:—

Spines of leaf-sheath tumescent above, hollowed below; ochrea short, truncate; petiole very short or obsolete; rhachis near the base flat and smooth above, channelled at the sides to receive the leaflets, trigonous upwards, armed below along the middle and occasionally along the sides with rather approximate, solitary, black-tipped claws; leaflets very numerous, narrowly lanceolate, apex very gradually acuminate, 1-ribbed, but with distinct primary nerves, the rib usually bearing scattered bristles on both surfaces, margins ciliate with spreading bristles, up to 12 in. long and .8 in. wide; primary spathes tubular, the lowest acutely 2-edged, smooth or armed at the sides with straight spines, the upper slightly widened upwards, flat at the base on the inner face, armed on the back with strongish claws; fruit globose or slightly longer than wide, .6 in. long, minutely apiculate, scales rhomboid, nearly as long as wide, very faintly channelled, light straw-coloured, the apex sometimes reddish-brown, the margins closely toothed.....8. *Rotang*.

Spines of leaf-sheath needle-like; rhachis acutely trigonous, subregularly armed on the flat lower face with short, solitary claws; leaflets numerous, not very close-set, narrowly ensiform, apex gradually acuminate and bristly penicillate, 3-ribbed above, the ribs above bearing a few bristles with bulbous bases, up to 12 in. long and .5 in. wide, margins minutely appressed, bristly ciliate; upper primary spathes narrow-cylindric, loosely sheathing, sprinkled with short prickles; very young fruit almost at right angles to the spikelet, subglobose-ovate, broadly conical at the apex, .4 in. long, scales semicircular, slightly apiculate, not channelled, yellowish-brown at the base, chestnut apically, margins finely erose-toothed....9. *Hookerianus*.

Leaf-sheath and its flat, straight or slightly hooked spines greyish-brown scurfy; petiole green, up to 12 in. long; rhachis acutely trigonous, armed on the flat lower face with a single medial series of solitary claws; leaflets

numerous, narrowly ensiform, apex long acuminate, bristle-penicillate, distinctly 3-keeled above, naked or with a few long bristles on the ribs above, margins distinctly bristle-ciliate, up to 28 in. long (usually 15—20), 1—1.25 in. wide; lower primary spathes somewhat compressed and 2-keeled, armed with solitary, straight, short, broad-based spines, upper elongate, sometimes up to 18 in. long, almost polished, tubular, base long attenuate, more or less densely prickly on the outer side in the lower half and, like the lower, prickly all round in the apical part; fruiting perianth shortly pedicelliform; fruit nearly globose, .7 in. diam., very suddenly contracted into a short conic beak, terminated by the persistent stigmas; scales rhomboid, not channelled, black or chestnut-brown with a dark marginal band, distinctly erosely toothed.....10. *Huegelianus*.

Leaf-rhachis produced into a cirrus up to 3 ft. long armed with many strong, irregularly aggregated $\frac{1}{2}$ — $\frac{3}{4}$ -whorled claws; sheaths not flagel-liferous, more or less armed with very large laminar, elastic, elongate-triangular or sublanceolate spines up to 1.25 in. long, sometimes scattered but more often confluent and irregularly whorled at intervals of 1—2.25 in.; rhachis in lower portion biconvex, armed beneath with solitary strong claws, upwards 2-faced and smooth above, obsoletely angular beneath and armed with half-whorled strong claws; leaflets 28—30, very inequidistant, more or less geminate on each side, with irregular interspaces 6—10 in. long, broadly lanceolate, or elliptic-lanceolate, conspicuously concavo-convex, shortly acuminate, apex bristle-hispid, up to 16 in. long and 3 in. wide, 3—7-ribbed, margins appressedly bristly; primary spathes tubular, closely sheathing, the lower compressed with 2 acute spinous edges, the upper more cylindric, more or less armed on the outer side with robust sub-deflexed spines; fruit unknown.....11. *latifolius*.

1. CALAMUS THWAITESII, Becc. var. CANARANA, Becc.; Ann. Calc. xi. 138, t. 12. *C. Thwaitesii*, Becc.; F. B. I. vi. 441.
Along the W. coast at low elevations.
Erect or high climbing. Vern. *Mal.* Valia chural; *Kan.* Jed-dubetta.
2. CALAMUS VIMINALIS, Willd. var. FASCICULATA, Becc.; F. B. I. vi. 444; Ann. Calc. xi. t. 57.
Vizagapatam and Ganjam Districts; Rampa Hills (Gamble); 1,000—2,000 ft.
A moderate-sized climber. Canes straw-coloured, shining, vitrous.
3. CALAMUS BRANDISH, Becc.; F. B. I. vi. 448; Ann. Calc. xi. t. 102.
W. Gháts from Kanara to Tinnevely.
A slender scandent shrub.
4. CALAMUS TRAVANCORICUS, Bedd.; F. B. I. vi. 452; Ann. Calc. xi. t. 121.
W. Gháts from Coorg (Bidie) to Tinnevely, up to 3,500 ft.
A graceful, slender climber. Vern. *Mal.* Cheru churel.
5. CALAMUS RHEEDII, Griff.; F. B. I. vi. 452; Ann. Calc. xi. t. 226 III.
Hilly tracts from Malabar (Rheede) to Tinnevely (Beddome).
Scandent. Vern. *Mal.* Katu churel.
6. CALAMUS PSEUDO-TENUIS, Becc.; F. B. I. vi. 445; Ann. Calc. xi. t. 69.
Throughout the W. Gháts; 1,000—5,000 ft.
A slender climber. Vern. *Kan.* Betta.
7. CALAMUS GAMBLEI, Becc.; F. B. I. vi. 453; Ann. Calc. t. 123.
Mukurti forests in the Nilgiris at 5,000 ft. (Gamble); Anaimalais

in S. Coimbatore; Udumbansholay in Travancore at 5,000 ft. (Meebold).

A moderate-sized shrub, probably scandent. Vern. *Tam.* Othaiyadi Perambu.

Var. *sphaerocarpa*, Becc. with spherical fruit.

Nilgiris in same locality as the type (Gamble).

8. *CALAMUS ROTANG*, Linn.; F. B. I. vi. 447; Ann. Calc. xi. t. 97.

In all the drier tracts; from sea-level to 1,500 ft.

A tall, slender climber. The cane is used for basket-making, but is too coarse for the best work. Vern. *Ur.* Betto; *Tel.* Bettam; *Tam.* Churel, Sothu Perambu.

9. *CALAMUS HOOKERIANUS*, Becc.; Ann. Calc. xi. 226, t. 70 and App. t. 14.

W. Gháts.

Probably a tall, slender climber.

10. *CALAMUS HUEGELIANUS*, Mart.; F. B. I. vi. 452; Ann. Calc. xi. t. 122.

Nilgiri, Anamalai and Tinnevely Hills, 4,000—6,000 ft.

A moderate-sized climber.

11. *CALAMUS LATIFOLIUS*, Roxb.; F. B. I. vi. 455; Ann. Calc. xi. t. 176. Madgole Hills in the Vizagapatam District (A. W. Lushington); 3,000—4,000 ft.

A tall climber.

Family CLXV. PANDANACEAE.

Dioecious shrubs or small trees, sometimes scandent, often throwing out aerial roots which form struts. *Leaves* simple, narrow, acuminate, sessile, base sheathing, margins and keel beneath usually spinulose, usually arranged in tristichous spirals. *Spadices* axillary or terminal, simple or branched, clothed with leafy, sometimes coloured spathes. *Flowers* small, usually crowded or catkin-like; perianth usually absent. *Stamens* of ♂ flowers usually numerous; filaments free or connate; anthers erect, basifixed. *Pistillode* 0 or minute. *Staminodes* of ♀ flowers 0 or small. *Ovary* 1—many-celled, free or connate with those of adjoining flowers; ovules solitary and suberect or many and parietal; style short or 0, stigmas papillose. *Fruit* a globose or oblong syncarp of free or connate 1—many-celled woody or fleshy angular drupes or berries. Seeds minute, testa striate; albumen hard, fleshy; embryo minute.

Pandanus, Linn. f.

Characters of the family. *Inflorescence* capitate or spicate, simple or racemose; flowers sessile, crowded; perianth absent. *Stamens* numerous. *Staminodes* 0. *Ovules* solitary. *Fruit* usually solitary, forming a syncarp of free or connate drupes seated on a fleshy receptacle; the upper half of each carpel hollow or filled with a spongy pith-like tissue.

Ovary 5—12-celled. Leaves coriaceous, ensiform, caudate-acuminate, 3—5 ft. long, 1—2 in. wide, glossy green, margins with forward-pointing spinules, the keels with forward or backward-pointing spinules; spathes of the ♂ spadix lanceolate or linear-lanceolate, 5—24 in. long, the lower with a long flagellum, white, fragrant; ♂ spadix with numerous cylindric spikes 2—4 in. long; anthers .15—.2 in. long; ♀ spadix solitary, 2 in. diam.; carpels confluent in groups of 4—10; syncarp 6—10 in. long, yellow or red; drupes of 5—12 carpels, carpels 2—3 in. long, turbinate, angular, apex rounded with a depressed centre.....1. *tectorius*.

Ovary 1-celled:—

Drupe club-shaped, nearly 2 in. long and .4 in. wide, connate to just below the broadly convex pyramidal apex; style .8—1 in. wide, somewhat bilobed; anthers .08—.1 in. long; lower ♂ spathes flagelliferous.....2. *canaranus*.

Drupe cylindric:—

Anthers .2 in. long. Leaves dark-green, 6—15 ft. long, 3—6 in. wide, margins and keel below armed with short, sharp, forward-pointing spinules, not conspicuously tessellated; ♂ spathes golden-yellow, unscented, the lower attaining 3 ft. long and 4 in. wide, produced into a spinulose 3-quetrous acumen, the margins not spinulose or only slightly so near the apex; syncarp subtrigono-oblong, 6—9 in. long, orange-red; drupes connate, obconic-cylindric, 1.2—1.6 in. long, .3—.4 in. wide, apex convex, style 2—3-forked, spine-tipped

3. *furcatus*.

Anthers filamentous, .5—.6 in. long. Leaves chartaceous, up to 8 ft. long, 1—1.75 in. wide, margins and keel (sometimes 2-keeled) beneath ascendingly spinulose, glaucous below, conspicuously tessellated by the raised longitudinal veins and transverse venules; ♂ spathes boat-shaped, lower flagelliferous, margins spinulose throughout or only in the upper half; syncarp oblong-rotund, up to 5 in. long; drupes connate, slightly narrowed to the base, 1.6 in. long, .25 in. wide, free apex pentagonal-pyramidal, terminated by the entire subspinescent subulate style.....4. *Thwaitesii*.

1. *PANDANUS TECTORIUS*, Soland. *P. fascicularis*, Lam.; F. B. I. vi. 485. *P. odoratissimus*, Roxb. Cor. Pl. t. 94—96.

In all Districts, especially near the coast. Often planted as a hedge. The Screw Pine.

A branched shrub or small tree up to 25 ft. high. The leaves are used for mat- and umbrella-making and their fibres for cordage and fishing-lines; the roots are used in basket- and brush-making; an aromatic medicinal oil is distilled from the spathes; the floral leaves are eaten. Vern. *Hind.* Keora; *Ur.* Khia; *Tel.* Mogali; *Tam.* and *Mal.* Kaitha; *Kan.* Kaida.

2. *PANDANUS CANARANUS*, Warb.

Near Mangalore (Hohenacker).

Little is known of this plant; it appears to be that figured by Rheede in Hort. Malab. ii, t. 7 and called Perin-Kaida Taddi.

3. *PANDANUS FURCATUS*, Roxb.; F. B. I. vi. 484.

Cochin (Gamble); Travancore (Lawson, Barber).

A gregarious tree up to 40 ft. high. Appears to be the plant figured in Rheede's Hort. Malab. ii. t. 8 and called Kaida Tsjerria.

4. *PANDANUS THWAITESII*, Mart.

At Bantwal in S. Kanara (Hohenacker); near Aiyankavu in Travancore at 1,000 ft. (Bourdillon).

A common undershrub in evergreen forest with very fragrant white flowers (Bourdillon).

Family CLXVI. TYPHACEAE.

Aquatic or marsh herbs with perennial, creeping rhizome clothed with distichous scales. Leaves distichous, linear, erect or floating, sheathing below. *Flowers* monoecious, minute, in terminal superposed dense cylindric spikes, the upper spike ♂, the lower of ♀ flowers often intermixed with slender clavate bracts, sterile ♀ flowers or simple or branched hairs; perianth 0. *Stamens* 2—7, usually 3, rarely 1; filaments usually connate, tip of connective thickened, sometimes produced; anthers 4-celled, erect, basifixed. *Ovary* borne on a slender, usually densely hairy gynophore or in the axis of a membranous spatulate bract, 1-celled, fusiform, narrowed into a slender persistent style; stigma filiform or clavate; ovule solitary, pendulous from near the apex. Sterile ♀ flowers on a long axis with a clavate pistillode. *Fruit* minute, membranous or drupaceous, fusiform, detached with the hairy gynophore, dehiscing by an apical lid. *Seed* often adnate to the wall; albumen fleshy or floury; embryo axile, cylindric.

Typha, Linn.

The only genus; characters of the family.

TYPHA ANGUSTATA, Bory & CHAUB.; F. B. I. vi. 489.

In all districts from sea-level to 2,500 ft. The Reed Mace or Bulrush.

A robust plant up to 10 ft. high occurring in marshes. Leaves up to 8 ft. long, 2—1 in. wide, semi-terete above the sheath; ♂ and ♀ spikes separated by a considerable interval, up to 12 in. long, .25—.9 in. diam., brown, ♂ paler and more slender, ♀ flowers mixed with clavate sterile pistillodes. Vern. *Tel.* Jambu; *Tam.* Sambu.

Family CLXVII. ARACEAE.

Herbs or shrubs or small trees, sometimes climbing by aerial roots; rhizomatous or tuberous; juice often acrid, sometimes milky. *Leaves* in herbaceous species solitary, clustered or radical, in shrubby and arboreal species alternate, often fleshy or coriaceous, simple, entire or lobed, or variously compound, often appearing at different times from the inflorescence; petioles sheathing. *Flowers* hermaphrodite, monoecious or dioecious, sessile or shortly pedicelled on a spadix which is more or less enclosed in a spathe, neuters often present; perianth 0 or of scales. *Anthers* 4—8 in ♂ flowers, 1—many in the male, usually opening by a terminal pore. *Ovary* entire, rarely lobed, 1—3, rarely more, -celled; style 0, short or long; ovules 1—many in each cell. *Fruit* usually baccate, free or confluent. *Seeds* 1—many, usually embedded in mucilaginous pulp; albumen 0 or copious; embryo axile or in exalbuminous seeds thick with the plumule in a lateral slit.

Floating herb; leaves in a close spiral, cuneate.....1. **Pistia**.

Terrestrial or marsh plants, rooting in soil or epiphytic; leaves not in a close spiral:—

Erect, not scandent plants; no adventitious aerial roots:—

Quite unarmed:—

Marsh plants; rootstock creeping, not tuberous:—

Leaves not distichous; spadix enclosed in a chamber in the spathe; flowers monoecious:—

Leaves usually grass-like; ovaries few in a single whorl...2. **Cryptocoryne**.

Leaves broad; ovaries numerous in several cycles.....3. **Lagenandra**.

Leaves distichous; spadix free; flowers hermaphrodite.....4. **Acorus**.

Terrestrial or epiphytic plants; roots tuberous, rarely creeping:—

Leaves simple though often deeply lobed:—

Terrestrial, not bearing leafless bulbiferous shoots:—

Small plants; leaves rarely over 7 in. long:—

Leaves ovate-hastate or sagittate, not peltate:—

Spadix usually exerted from the spathe; ovules 1—2

5. **Typhonium**.

Spadix included in the spathe; ovules many.....6. **Theriophonum**.

Leaves suborbicular, peltate.....7. **Ariopsis**.

Robust herbs or shrubs; leaves ovate-cordate, rarely under 7 in. long:—

Ovules many, parietal; leaves peltate.....8. **Colocasia**.

Ovules few, basal; leaves peltate or not.....9. **Alocasia**.

Epiphytic or in pockets on bare rock; bearing leafless bulbiferous shoots; rarely flowering.....10. **Remusatia**.

Leaves compound:—

Leaflets pedately or radially arranged.....11. **Arisaema**.

Leaves 3-partite, each division again variously cut:—

Spadix with a barren appendage.....12. **Amorphophallus**.

Spadix without a barren appendage:—

Flowers monoecious, ♂ and ♀ inflorescences separated by a belt of large clavate neuters.....13. **Plesmonium**.

Flowers hermaphrodite.....14. **Anaphyllum**.

Thorny marsh plants.....15. **Lasia**.

Scandent shrubs with adventitious aerial roots:—

Leaves ovate to suborbicular; flowers monoecious:—

Leaves entire; petioles winged throughout; ovule solitary.....16. **Scindapsus**.

Leaves usually perfoliate or more or less pinnatifid, rarely entire; petioles not winged; ovules many.....17. **Rhaphidophora**.

Leaves linear- to oblong-lanceolate, entire; flowers hermaphrodite...18. **Pothos**.

1. *Pistia*, Linn.

A small, floating, gregarious, stoloniferous herb; roots of tufted fibres. *Leaves* sessile in a close spiral, together forming a cup. *Spathe* small, shortly peduncled, shortly tubular below, opening out into an ovate, concave limb. *Spadix* adnate to the back of the tube of the spathe, free above. ♂ *flowers* in a whorl of a few connate stamens beneath the apex of the spadix. *Neuters* few, minute, confluent in a ring below the ♂. ♀ *flowers* solitary. *Perianth* 0. *Ovary* 1-celled, obliquely adnate to the spadix, the apex free and forming a conical style; stigma discoid; ovules many, crowded on a parietal or subbasal placenta, orthotropous. *Berry* ovoid; pericarp thin. *Seeds* few to many, oblong or obovoid; albumen copious, floury; embryo minute, cuneiform.

PISTIA STRATIOTES, Linn.; F. B. I. vi. 497; Roxb. Cor. Pl. t. 268.

Common in tanks and wells in all districts; up to 3,000 ft.

The Water Soldier.

Leaves obovate-cuneate, apical margin rounded or retuse or shallowly lobulate and undulate, densely, closely pubescent on both faces, 1—4 in. long, very variable in breadth; spathe 5 in.

long. Vern. *Hind.* Jalkhumbi; *Tel.* Antharai-dhaman, Nirubuduki; *Tam.* Kodi-tamarai, Agasa-tamarai; *Mal.* Koddapail.

2. *Cryptocoryne*, Fisch.

Aquatic, marsh, or riverain herbs; rootstock creeping; stem short or 0. *Leaves* often grass-like, radical. *Spathe* often partly subterranean or submerged, margins connate into a tube below with a transverse septum forming an almost closed chamber for the spadix, the tube more or less produced above the chamber and then expanding into a usually narrow, often contorted, limb. *Spadix* very slender, adnate at the tip to the septum of the spathe; ♂ and ♀ flowers separated by a bare region of the spadix. *Perianth* 0. ♂ flowers numerous, forming a cylinder. *Stamens* 1—2; anthers sessile, cells 2, conical, pollen vermiform. *Ovaries* in a single whorl of 4—7 at the base of the spadix, connate, 1-celled, mixed with a few neuters; style short; recurved; ovules many, erect, orthotropous. *Berries* of fleshy, connate, 2-valved carpels. *Seeds* many, oblong; testa rugose; albumen copious; embryo axile.

Limb of spathe longer than the limb:—

Limb of spathe ovate-oblong, densely fimbriate-ciliate, 2—3 in. long, .6—1.2 in. wide. Leaves linear-oblong or lanceolate, inequilateral, 7—16 in. long, .8—4 in. wide; petioles 4—12 in. long; peduncles short, tube of spathe up to 12 in. long; ovaries 5—7; fruit long-peduncled, globose, 1 in. diam.1. *ciliata*.

Limb of spathe not fimbriate-ciliate:—

Spathe closely twisted, 4—10 in. long, limb linear-lanceolate, caudate, 1—3 in. long. Leaves linear or narrowly linear-lanceolate, grass-like, up to 18 in. long and .75 in. wide; peduncle very short; ovaries 4—6.2. *retrospiralis*.

Spathe not twisted; limb ovate or lanceolate:—

Leaves oblong-lanceolate, finely acuminate, 4—6 in. long, .5—8 in. wide, margins flat; peduncle short; tube of spathe 4—5 in. long, limb narrowly ovate, 1—1.5 in. long with a subulate-caudate prolongation up to 3 in. long; ovaries 5—6.3. *consobrina*.

Leaves linear, 6—10 in. long, .25—3 in. wide, margins crisply waved; peduncles slender, 2—3 in. long (fruiting up to 5 in. long); tube of spathe 5—6 in. long, limb lanceolate, acuminate, 1.5—3 in. long; ovaries 6—7

4. *Wightii*.

Tube of spathe shorter than the limb:—

Limb of spathe linear-lanceolate, 3—5 in. long, at first twisted, margins denticulate, transversely lamellate within, tube obconic, less than 1 in. long; peduncle very short included with the tube of the spathe in the leaf-sheath. Leaves linear-lanceolate, 3—8 in. long, .3—6 in. wide; ovaries 5—6, stigmas broadly elliptic.5. *spiralis*.

Limb of spathes very slender, 6—8 in. long, closely twisted, margins entire, not lamellate within, tube nearly cylindric, 1 in. or less long; peduncle very short. Leaves narrowly linear, 8—12 in. long, .5—7 in. wide; ovaries 4—5, stigmas orbicular or broadly oblong.6. *unilocularis*.

1. *CRYPTOCORYNE CILIATA*, Fisch.; F. B. I. vi. 492; Wt. Ic. t. 775.

Coromandel (Roxburgh); Mysore and Carnatic (G. Thomson).
Spathe dull-green, spotted with purple near the limb which has an ovate yellow patch nearly 1 in. long in the mouth.

2. *CRYPTOCORYNE RETROSPINALIS*, Kunth; F. B. I. vi. 493; Wt. Ic. t. 772.

In most Districts up to 1,500 ft.
Spathe deep-green, streaked with purple.

3. *CRYPTOCORYNE CONSOBRINA*, Schott; F. B. I. vi. 493.
W. Gháts (G. Thomson, Perrottet).
4. *CRYPTOCORYNE WIGHTII*, Schott; F. B. I. vi. 493.
Mysore (Wight); Calicut.
5. *CRYPTOCORYNE SPIRALIS*, Fisch.; F. B. I. vi. 494; Wt. Ic. t. 773.
E. and W. Coasts at low levels.
Spathe greenish without, dark-purple within.
6. *CRYPTOCORYNE UNILOCULARIS*, Wight Ic. t. 774. *C. Roxburghii*,
Schott; F. B. I. vi. 494.
N. Circars (Roxburgh); Coromandel (Wight).
Spathe within purple marbled with white.

3. *Lagenandra*, Dalz.

Marsh herbs; rootstock creeping, usually annulate. *Leaves* usually long-petioled and broad. *Spathe* tubular below, margins connate with a transverse septum forming an almost closed chamber for the spadix, limb expanded above. *Spadix* slender, adnate by its apex to the septum of the spathe; ♂ and ♀ portions well separated by a bare region of the spadix. *Perianth* 0. ♂ *flowers* numerous, forming a cylindric or oblong mass near the apex of the spadix. *Stamens* 1–2; anthers sessile, pollen sausage-shaped. *Ovaries* numerous, at the base of the spadix, spirally arranged and free or in several connate cycles, 1-celled; stigma subsessile, peltate or discoid; ovules 1 or 2—many on a basal placenta, orthotropous. Berries free or connate. *Seeds* 1–6 oblong, furrowed; albumen copious; embryo elongate, axile.

Rhizome stout, up to 2 in. diam.; leaves oblong or elliptic-oblong, obtuse or acute at both ends, 6–17 in. long, 2–5 in. wide, margins undulate, veins very numerous, ascending, nearly straight from the very broad midrib; petioles as long as the blade; stipular sheaths acuminate, 2-keeled, up to 7 in. long; peduncles shorter and more slender than the petioles, up to 12 in. long; spathes 3–9 in. long, tube broad, limb much longer, ovate-lanceolate, caudate-acuminate.....1. *ovata*. Rhizome up to .5 in. thick; leaves ovate- or elliptic-oblong, acute or obtuse, base rounded, sometimes emarginate, 3–6 in. long, 1.4–2.6 in. wide; petioles usually longer than the blade, up to 7.5 in. long; veins numerous, ascending from the broad midrib, widely arched, margins not undulate; stipular sheaths triangular-lanceolate, acute, not keeled, up to 2.5 in. long; peduncles 1 in. or less long, slender; tubular portion of the spathe 2 in. long, oblong, closed chamber about half that length, slightly constricted above the spadix, limb triangular, terminating in a subulate-filiform appendage 1.5–2 in. long, verrucose within.....2. *Meeboldii*.

1. *LAGENANDRA OVATA*, Thw. *L. toxicaria*, Dalz.; F. B. I. vi. 495.
Throughout the W. Coast and Gháts, in marshes and along water-courses, often gregarious; from sea-level to 4,000 ft.
Spathe greenish-purple without, dark-purple within. Vern. *Mal. Karin-pola*.
2. *LAGENANDRA MEEBOLDII*, Fischer n. comb. *Cryptocoryne Meeboldii*,
Engl. in Pflanzenr. iv. 23. F. 234.
Agalhatti, Mysore at 3,000 ft. (Meebold); Tuppanad, S. Malabar at 650 ft. (Fischer).
Spathe dark-purple.

4. *Acorus*, Linn.

Aromatic marsh herbs; rootstock creeping. *Leaves* distichous, ensiform, bases equitant. *Peduncle* like the leaves and as long. *Spathe*

continuing the ensiform peduncle. *Spadix* sessile, cylindric, dense-flowered. *Flowers* hermaphrodite. *Perianth* of 6 orbicular, concave segments. *Stamens* 6; filaments linear, flat; anthers reniform, cells confluent above. *Ovary* conical, 2—3-celled; style and stigma minute; ovules many, pendulous, orthotropous. *Berries* oblong. *Seeds* few, oblong, pendent from the apex of the cells; albumen fleshy; embryo axile.

ACORUS CALAMUS, Linn.; F. B. I. vi. 555.

Lower Pulney Hills (Bourne). The Sweet Flag.

Rootstock very aromatic; leaves 1·5—6 ft. long, 3—1·25 in. wide; spathe 6—30 in. long; spadix 2—4 in. long, free from the spathe. The roots are used medicinally and also to protect clothing from insect-attack. Often cultivated. Vern. *Hind.* Gorbach; *Tel.* Vasa Vadaja; *Tam.* Vashambu; *Mal.* Vashanpa; *Kan.* Bajai.

5. *Typhonium*, Schott.

Tuberous herbs. *Leaves* entire, 3—5-lobed or pedatisect; appearing with the inflorescence. *Spathe* with a short, convolute, persistent tube below, mouth constricted, expanded above into a broad or narrow deciduous limb. *Spadix* usually exserted, with a long smooth or muricate, often stipitate, barren appendage. ♂ and ♀ flowers well separated, with neuters above the ♀ and sometimes below the ♂. *Perianth* 0. *Stamens* 1—3; anthers subsessile. *Ovary* 1-celled; stigma sessile; ovules 1—2, basal, erect, orthotropous. *Berry* ovoid, 1—2-seeded. *Seeds* globose; albumen copious; embryo axile.

Limb of spathe open, broadly ovate:—

Apex of spathe acute or acuminate, not twisted; neuters above ♀ flowers numerous, long, filiform, curved. Leaves hastately 3-lobed or sub-3-partite, 2—12 in. diam., lobes ovate, acute or acuminate; petioles up to 1 ft. long; peduncle 1—4 in. long; spathe 3—12 in. long, 1·5—4 in. wide, nearly flat; appendage of spathe stipitate, muricate, base expanded and intruded.....1. *trilobatum*. Apex of spathe elongate-caudate, twisted; neuters above ♀ flowers dense, erect, short, obtuse or subacute. Leaves cordately or hastately sagittate, sub-3-lobed, 2—5 in. long, 2—4 in. wide; petioles 4—8 in. long; peduncles 2·5—2 in. long; spathe 1·5—4 in. long, 1—3 in. wide; appendage of spadix truncate or rounded at the base.....2. *divaricatum*.

Limb of spathe narrowly lanceolate, acuminate, not expanded. Leaves ovate-cordate, sagittate or hastate-oblong, 1—7 in. long, sometimes almost 3-partite and 6 in. across; petioles 4—12 in. long; peduncles slender, 2—8 in. long; spathe 3—8 in. long, 3—5 in. wide, tube ovoid or oblong; appendage of spathe shortly stipitate, as long as or longer than the spathe, base conical, tip filiform; neuters short, lower clavate, upper subulate.....3. *flagelliforme*.

1. *TYPHONIUM TRILOBATUM*, Schott; F. B. I. vi. 509. *Arum orixense*, Roxb.; Wt. Ic. t. 801.

E. Coast. Not common.

Spathe red-purple within; appendage of spathe bright-red.

2. *TYPHONIUM DIVARICATUM*, Dcne.; F. B. I. vi. 510. *Arum divaricatum*, Linn.; Wt. Ic. t. 790.

E. Coast. Not common.

Spathe red-brown.

3. *TYPHONIUM FLAGELLIFORME*, Bl. *T. cuspidatum*, Dcne.; F. B. I. vi. 511. *Arum flagelliforme*, Roxb.; Wt. Ic. t. 791.

E. and W. Coasts as far N. as Cochín; at low elevations.
Spathe greenish, white or lurid without, red within.

6. *Therophonum*, Bl.

Tuberous herbs. *Leaves* few, cordate, sagittate or hastately 3-lobed; petioles long. *Spathe* tubular below, slightly constricted at the mouth, limb erect, oblong or lanceolate, acuminate or subcaudate. *Spadix* included, slender. ♂ and ♀ flowers well separated. *Perianth* 0. *Stamens* 1—2, aggregated in a narrow, cylindric mass 3—5 times longer than the ♀ inflorescence; anthers subsessile, globose, connective thin, sometimes produced. *Ovaries* usually few, oblong, 1-celled; stigmas sessile; ovules few to many, basal or apical, orthotropous. *Neuters* below rather long, filiform, upper shortly subulate, uppermost sometimes verrucose. *Berries* ovoid. *Seeds* ovoid, erect or pendulous; albumen copious; embryo axile.

Anthers beaked, opening by slits; neuters many, close to the anthers:—

Spathe subcylindric, margins waved and crenate, subacute or shortly cuspidate, 3—5 in. long, 1.25—1.75 in. wide, base of tube broadly truncate, intruded. Leaves orbicular-hastate or hastate-triangular-trilobed, margins undulate, 1.5—4 in. long; petioles 2—12 in. long; peduncle a little shorter; spadix half as long as the spathe, appendage cylindric; neuters 13—16 in. long.....1. *minutum*.

Spathe oblong, acute, margins not crenate, 4—6 in. long, 1.25—2 in. wide, base truncate. Leaves hastately triangular, sometimes 3-lobed, up to 4 in. diam.; petioles 3—12 in. long; peduncles 2—4 in. long; spadix about half as long as the spathe, appendage cylindric; neuters 25—33 in. long.....2. *Wightii*.

Anthers not beaked, opening by pores; lower neuters near the ovaries, upper few or 0:—

Leaves distinctly 3-lobed, lobes linear to broadly triangular, the lateral usually at right angles to the apical or even sometimes pointing slightly forwards, the sinus very wide, midlobe largest, all acute or acuminate, up to 5 in. long and 4.5 in. across the lateral lobes; petioles usually much longer than the blade; somewhat shorter than the peduncle; spathes 2—5 in. long, tube short, cylindric or oblong, base rounded, limb expanded, oblong, 1—2 in. wide, acute, spadix about half as long as the spathe, appendage shortly stipitate, slender, subulate.....3. *indicum*.

Leaves cordately linear- to ovate-hastate, not or indistinctly 3-lobed, acute, basal lobes rounded, sinus narrow, up to 5 in. long and 2 in. wide; petioles slender, as long as or up to 3 times longer than the blade; peduncles very slender, short; spathe with a long cylindric tube, limb narrowly lanceolate, acute; spadix about $\frac{1}{4}$ the length of the spathe, appendage stipitate, slender, subulate.....4. *infaustum*.

1. *THERIOPHONUM MINUTUM*, Engl. *T. crenatum*, Bl.; F. B. I. vi. 512.
Mootalur, Madras (Wight); Tranquebar (Heyne).
Spathe pale-yellowish-green, striated, the waved margin red; appendage purple.
2. *THERIOPHONUM WIGHTII*, Schott; F. B. I. vi. 512.
Carnatic (Wight).
Spathe white (?).
3. *THERIOPHONUM INDICUM*, Engl. *T. Dalzellii*, Schott; F. B. I. vi. 513.
Wynaad (Beddome), Attapadi Valley and Anamalai Hills at 2,000 ft. (Fischer); Krishnagiri, Salem (Jacob); Punalur, Travancore (M. Rama Rao).
Tube of spathe green fading to white, limb deep-purple; appendage greenish-yellow.

4. THERIOPHONUM INFAUSTUM, N. E. Br.; F. B. I. vi. 513.

Palghat (Wight); Travancore (V. Narayanswami).
Spathe white or purplish.

7. Ariopsis, Nimmo.

Small tuberous herbs. *Leaves* entire, peltate, appearing with or before the inflorescence. *Spathe* small, cymbiform, open, tube 0, persistent. *Spadix* shorter than the spathe, appendage 0. ♂ and ♀ flowers approximated, ♂ imbedded in the spadix, neuters 0. *Perianth* 0. *Anthers* connate in groups of 3, each 2-celled, surrounding a pore into which all open. *Ovaries* few, on one side of the spadix only, 1-celled, oblong; stigmas sessile, stellately 4—6-fid; ovules many, orthotropous, 2-seriate on 4—6 parietal placentæ. *Berries* 3—6-angled. *Seeds* linear-oblong, slightly attenuate to an obtuse apex, pendulous; albumen copious; embryo axile.

ARIOPSIS PELTATA, Nimmo; F. B. I. vi. 519. *Remusatia vivipara*, Wight Ic. t. 900.

W. Coast and Ghâts; from near sea-level to 4,000 ft.

Tubers small, clustered, with many slender root-fibres; leaf solitary, suborbicular, sometimes broader than long, apiculate, 1—8·5 in. diam., base rounded, emarginate or cordate; petioles about as long as the blade, slender, inserted about $\frac{1}{3}$ up the blade; peduncles 1—4 in. long, slender; spathes 1—1 in. long, 3—6 in. wide, apiculate, violet with a green dorsal ridge, paler within, ♂ flowers dark-purple, ♀ green, stigmas yellow; seeds longitudinally furrowed.

8. Colocasia, Schott

Tall, coarse herbs; tuberous or with a short stout caudex. *Leaves* appearing with the flowers, simple, peltate. *Peduncles* stout. *Spathe* with a thick, convolute, accrescent tube, mouth constricted, persistent, limb erect, deciduous. *Spadix* free, shorter than the spathe, appendage cylindric-subulate or 0. ♂ and ♀ flowers with interposed flat neuters. *Perianth* 0. *Stamens* 3—6, connate in an obpyramidal synandrium, cells linear, opening by short slits. *Ovaries* ovoid or oblong, 1-celled; stigmas sessile, flat, 3—5-rayed; ovules several to many, suborthotropous, on 2—4 parietal placentas. *Berries* obconic or oblong. *Seeds* oblong; albumen copious; embryo axile.

COLOCASIA ANTIQUORUM, Schott; F. B. I. vi. 523; Wt. Ic. t. 786, fig. 1.

Arum nymphaeifolium, Roxb.; Wt. Ic. t. 786, fig. 2.

In all Districts, wild or cultivated; sea-level to 3,000 ft.

Tubers up to 6 in. diam.; leaves ovate- to suborbicular-cordate, 6—20 in. long, 3—12 in. wide, apex rounded and usually apiculate, basal sinus triangular, margins undulate, dark-green sometimes clouded with black; petioles stout, 3—4 ft. long, green or violet, inserted $\frac{1}{4}$ — $\frac{1}{3}$ of the blade from the sinus; peduncles much shorter, solitary or clustered and connate; spathe 8—18 in. long, tube oblong, limb narrowly lanceolate, caudate-acuminate, pale-yellow, 2—4 times longer than the tube.

All parts of the plant are eaten. Vern. *Hind.* Kachu; *Ur.* Saru; *Tel.* Kaladi; *Tam.* Shana-dumpa; *Mal.* Shamai-gaddai; *Kan.* Kachchi.

9. *Alocasia*, Neck.

Stout herbs or shrubs, roots usually rhizomatous but often forming a distinct above-ground caudex. *Leaves* entire, usually very large, sometimes peltate, more or less ovate-cordate or -sagittate; petioles long. *Peduncles* usually several, sometimes connate, appearing with the leaves. *Spathes* with a thick, convolute, persistent tube constricted at the mouth; limb erect, cymbiform, cucullate or oblong, much longer than the tube. *Spadix* free, shorter than the spathe; appendage cylindric-subulate or 0. ♂ and ♀ flowers separated by a few flat neutrals. *Perianth* 0. *Stamens* 3—8, connate into an obpyramidal, hexagonal synandrium. *Ovaries* ovoid or oblong, 1-celled; styles very short; stigmas 2—4-lobed; ovules few, basilar, erect, orthotropous. *Berries* enclosed in the accrescent tube of the spathe which becomes lacerate, ellipsoid or obconic-ellipsoid or subglobose. *Seeds* subglobose, erect, testa smooth; albumen copious; embryo axile.

Not caulescent; lowest secondary nerves of the leaves flabellately spreading, not united for any distance with the primary nerves of the basal lobes. Caudex a short cylindrical tuber up to 2 in. diam.; leaves broadly ovate-cordate, obtuse and shortly apiculate, 6—8 in. long, nearly 6 in. wide, margins undulate; petioles stout, 8—10 in. long, sinus semi-circular; spathe 4—6 in. long, limb cucullate; spadix nearly as long, appendage thickened at the base, subulate, subacute.

1. *montana*.

Caulescent; lowest secondary nerves of the leaves united to the primaries of the basal lobes to near their apex:—

Leaves not or very slightly peltate, ovate-cordate, up to 3 ft. long, width less than the length from sinus to apex, acute or rounded with a deflexed cusp, sinus rather narrow and deep, margins undulate. Caudex up to 8 ft. long and 8 in. diam.; petioles 2—3 ft. long; peduncles 4—8 in. long, several, usually paired; spathes 8—12 in. long, limb narrowly oblong, apex rounded with a small subulate cusp; spadix about as long, appendage conoid, rugulose.

2. *indica*.

Leaves distinctly though not deeply peltate, broadly ovate-sagittate, 2—4 ft. long, 1·5—3 ft. wide, width greater than the length from sinus to apex, shortly apiculate, sinus deep and narrow, margins undulate. Caudex up to 16 ft. long and 1 ft. diam., but usually much smaller; petioles 2—4 ft. long; peduncles 6—8 in. long, usually 2 or more in each axil, stout; spathes 6—10 in. long, limb hooded-cymbiform, cuspidate; spadix nearly as long, appendage nearly as long as the floral part, cylindric, obtuse, sinuously sulcate.....3. *macrorrhiza*.

1. *ALOCASIA MONTANA*, Schott; F. B. I. vi. 525. *Arum montanum*, Roxb.; Wt. Ic. t. 796.

N. Circars (Roxb.).

Spathe coloured. The roots are said to be used for poisoning tigers.

2. *ALOCASIA INDICA*, Schott; F. B. I. vi. 525. *Arum indicum*, Roxb.; Wt. Ic. t. 794.

Probably not wild in S. India, but widely cultivated.

Spathe yellowish-green, sometimes with reddish streaks; smelling offensively. The stem and roots are eaten. Vern. *Hind.* Mankanda.

3. *ALOCASIA MACRORRHIZA*, Schott; F. B. I. vi. 526. *Arum odorum*, Roxb.; Wt. Ic. t. 797.

Rampa Hills (Ramaswami, Narayanswami).

Spathe pale-green; fragrant.

10. *Remusatia*, Schott

Tuberous herbs emitting leafless bulbiferous shoots from the sides of the tuber. *Leaf* solitary or 2 from a tuber, entire, peltate, ovate-cordate. *Spathes* coriaceous; tube ovoid, convolute, accrescent over the fruit, mouth constricted; limb broad or narrow, erect or refracted, deciduous. *Spadix* very short, sessile; appendage 0. ♂ and ♀ flowers separated by neuters. *Perianth* 0. *Stamens* 2—3; anthers sessile, connate into a 4—6-angled and sulcate, flat-topped synandrium, synandria densely packed, mixed with neuters. *Ovaries* crowded, ovoid, 1-celled or 2—4-celled upwards; stigmas sessile, disciform; ovules many, orthotropous or nearly so, in 2 series on 4—6 parietal placentae. *Berries* small, obovoid. *Seeds* small, ovoid; albumen copious; embryo axile.

REMUSATIA VIVIPARA, Schott; F. B. I. vi. 521. *Arum viviparum*, Roxb.; Wt. Ic. t. 798.

In all Districts up to 5,000 ft. In clefts on tree trunks or in pockets of soil on bare rock; rarely flowering but propagating by bulbils.

Tubers .5—1.5 in. diam.; bulbiferous shoots up to 18 in. long, slender, brown, bulbils at the nodes oblong, squarrosely scaly, .1—2.5 in. long; leaves acute, up to 18 in. long and 12 in. wide, margins undulate, basal lobes rounded; petioles 6—12 in. long, inserted $\frac{1}{4}$ — $\frac{1}{2}$ of the blade above the sinus; peduncles short, enclosed in cataphylls; spathe 4—5 in. long, tube ovoid or oblong, green, much shorter than the orbicular-ovate or caudate, golden-yellow limb; spadix hardly longer than the tube, ♂ portion clavate.

11. *Arisaema*, Mart.

Tuberous herbs. *Leaves* 1—2, rarely 3, 3- or pedati-sect or the leaflets radiate. *Spathes* deciduous, convolute, limb often broad, usually incurved, often acuminate or caudate. *Spadix* included or exerted; appendage often very long. *Flowers* dioecious or monoecious and the sexes contiguous, neuters 0, few or many above the fertile. *Perianth* 0. ♂ flowers many, usually stipitate. *Stamens* 2—5; anthers sessile, oblong or subglobose. *Ovaries* densely crowded, 1-celled; styles short or 0; stigmas disciform; ovules 1—9, basal, orthotropous. *Berries* 1—few-seeded. *Seeds* ovoid or globose; albumen copious; embryo axile.

Spadix with appendage much longer than the spathe. Leaves usually pedatisect, sometimes nearly radiate; leaflets 5 (rarely 4) —18, sessile or petiolulate, linear-to ovate- or ob-lanceolate, subcaudately acuminate; petioles 1—3 ft. long; sheaths often purple-mottled; peduncles .5—4 ft. long; spathe 3—6 in. long; tube sub-cylindric, gaping, gradually dilated into the ovate or ovate-oblong, acuminate,

incurved limb; spadix with a smooth appendage tapering like a rat-tail, sigmoidally curved, often erect, then curved down and finally again erect; flowers monoecious or dioecious, a few neuters above the ♂.....1. *tortuosum*.

Spadix with appendage shorter than the spathe, rarely exerted from the tube; leaves always radiate:—

Spathe caudate-acuminate:—

Appendage of spadix not stipitate, apex clavate; neuters present in the ♀ inflorescence:—

Leaflets 5—11, linear- to ob-lanceolate, acuminate, margins papillose, 2—11 in. long, .8—3 in. wide; petioles stout, up to 2 ft. long, usually mottled and banded with red and brown; peduncles shorter than the petioles; spathes 4—12 in. long; tube narrowly cylindric, ribbed, dilated into the ovate-lanceolate limb which terminates in a caudate prolongation .3—1.5 in. long, mouth often slightly revolute; spadix tapering into a narrowly clavate appendage.....2. *Leschenaultii*.

Leaflets 10 (in the only known specimen), obovate-lanceolate, abruptly cuspidate, margins smooth, revolute, base cuneately narrowed from about $\frac{1}{2}$ below the apex with nearly straight sides, posterior leaflets 6 in. long, 2.5 in. wide, the others decreasing to the anterior pair 4.5 in. long, 1.5 in. wide; petiole stout, suffused with pale reddish-brown and spotted with pink; peduncle stout; spathe 8 in. long; tube 3 in. long, gaping above; limb broadly ovate-acuminate, inarching, mouth revolute, apex long-caudate; spadix a little longer than the tube, appendage stout, cylindric, base slightly enlarged, obtuse; flowers monoecious.....3. *pulchrum*.

Appendage of spadix stipitate, slender, tapering to the erect or recurved tip. Leaflets 5—9, cuneately obovate, cuspidate-acuminate, 3—5 in. long, 1.25—2 in. wide; petioles 10—22 in. long; peduncles shorter or longer; spathe 3.5—7 in. long; tube funnel-shaped; limb ovate-lanceolate, caudate-acuminate, mouth slightly revolute; neuters 0.....4. *Wightii*.

Spathe 3—5 in. long; tube broadly cylindric, base almost truncate, limb broadly ovate, acute, not caudate, margin dilated around the mouth. Leaflets 5—9, ovate- to oblong-lanceolate, acuminate, 2.5—7 in. long, .75—2.25 in. wide, veins close, parallel, submarginal close to the usually undulate, papillose margin; petioles rather slender, up to 16 in. long; peduncles as long, stouter, green mottled with red-brown; spadix with a slender, subulate appendage shortly exerted from the tube; flowers monoecious, neuters a few above the ♂.....5. *Murrayi*.

1. *ARISAEMA TORTUOSUM*, Schott; F. B. I. vi. 502. *Arum curvatum*, Roxb.; Wt. Ic. t. 788: *Arum tortuosum*, Wall. Pl. As. Rar. t. 111. Rampa Hills at 4,500 ft. (Narayanswami); Horsleykonda at 4,000 ft. (Fischer); W. Gháts, 3,000—7,000 ft. The Cobra-flower. Spathe pale-green or purplish. Vern. Tam. Katu-senai; Kan. Awu-mari-gidda.

Var. *neglectum*, Fischer. *A. neglectum*, Schott; F. B. I. vi. 504. Leaflets always radiate. W. Gháts.

2. *ARISAEMA LESCHENAUTII*, Bl.; F. B. I. vi. 504.

W. Gháts; 4,000—8,000 ft. The Cobra-flower.

Spathe dark-green, vertically striped with purple.

3. *ARISAEMA PULCHRUM*, N. E. Br.; F. B. I. vi. 505.

Sispara Ghát, Nilgiri Hills at 3,000 ft. (Beddome).

Spathe light-green tinged with purple at the base, vertically striped with white.

4. *ARISAEMA WIGHTII*, Schott; F. B. I. vi. 507.

W. Gháts; Billigirirangans at 5,000 ft. (Fischer); Nilgiri Hills (King); S. Coimbatore, Sholear banks at 3,300 ft. (Fischer);

Tinnevely Hills (Barber). Travancore 2,700—3,300 ft. (K. Venkoba Rao).

5. *ARISAEMA MURRAYI*, Hook; F. B. I. vi. 507.

Nilgiri Hills (G. Thomson, King).

Tube of spathe green, limb white with a red rim round the mouth of the tube.

12. *Amorphophallus*, Bl.

Tuberous herbs, rarely subarborescent. *Leaves* appearing after the flowers, 1—2 or 3, trisect, segments pinnati- or bipinnati-sect. *Peduncles* usually long. *Spathes* broadly ovate or oblong; limb campanulate or funnel-shaped, convolute or open. *Spadix* included or exerted. *Flowers* monoecious, crowded in cylindric masses, the 2 sexes contiguous or shortly separated by a few neutrals. *Perianth* 0. *Stamens* 1—6; anthers subsessile or the filaments as long, 2-celled, opening by pores, the 2 pores joined by a slit. *Ovaries* globose or ovoid, 1—4-celled; styles short or long; stigmas capitate, entire, emarginate or 2—4-lobed; ovules solitary, sub-basal, anatropous. *Neuters* 0 or few. *Berries* subglobose or ovoid. *Seeds* exalbuminous; embryo filling the seed.

♂ and ♀ inflorescences contiguous, neutrals 0:—

Leaves not bulbiferous; styles 3—4 times longer than the ovary; stigmas deeply 2—4 lobed:—

Appendage of spadix subglobose or amorphous, deeply sinuously lobed, equalling or longer than the fertile region, up to 5 in. diam. Tuber 8—10 in. diam.; leaves 1—3 ft. wide, segments spreading, entire or forked, the ultimate obliquely oblong, acuminate, 2·5 in. long; petioles 2—3 ft. long, stout, smooth or warted, dark-green with paler blotches; peduncles short, stout, elongating in fruit; spathes campanulate, fleshy below, 6—10 in. wide and long, margins recurved, undulate and crisped; spadix as long; ♂ and ♀ regions about equal in length; styles up to 5 in. long, purple.....1. *campanulatus*.

Appendage of spadix globose ovoid, smooth, shorter than the fertile region, up to 1·5 in. diam. Tuber 2—3·25 in. diam.; leaves as of the last species; peduncle very short, rough; spathe campanulate-infundibuliform, 3—5 in. diam., margins crisply waved; spadix shorter than the spathe, ♂ inflorescence about twice as long as the ♀; styles up to 3 in. long.....2. *dubius*.

Leaves bulbiferous at the forks, 12—18 in. diam.; leaflets lanceolate or obovate, 3—8 in. long, acute or acuminate, margins usually purple; petioles 3—4 ft. long, spotted. Tuber 2—4 in. diam.; peduncle 8—12 in. long, green and pink streaked with green or black; spathe erect, ovate-cymbiform, acute or obtuse, 4—8 in. long, 3—5 in. wide; spadix sessile, stout, about as long as the spathe; appendage about as long as the fertile region, elongate-conoid or oblong, rounded; ♂ inflorescence half as long again as the ♀.....3. *bulbifer*.

♂ and ♀ inflorescences separated by a row of neutrals:—

Spadix with appendage 3—6 times longer than the spathe. Tuber 2—2·2 in. diam., bulbiferous; leaves 1—2·5 ft. diam., segments lanceolate, long acuminate, 2—6 in. long; petioles 1—2 ft. long; spathes erect, ovate, convolute to the middle, 2—4 in. long, 1·4—2 in. wide, acute or acuminate; spadix stipitate, fertile region as long as the spathe or a little less; appendage linear-subulate, flexuous; neutrals oblong or elongate diamond-shaped, rather large, depressed, rugose.....4. *sylvaticus*.

Spadix with appendage as long as or a little shorter than the spathe. Tuber about 1 in. diam.; leaflets oblong, acute or acuminate, decurrent, 1—10 in. long; petioles 8—12 in. long; spathe 3 in. long, 1·2 in. wide, convolute below, expanded above into an erect, lanceolate, acute limb; spadix shortly stipitate, appendage slender, subulate, about 1½ times the length of the fertile region; neutrals elongate diamond-shaped, gibbous in the middle.....5. *Hohenackeri*.

1. AMORPHOPHALLUS CAMPANULATUS, Bl.; F. B. I. vi. 513. *Arum campanulatum*, Roxb. Cor. Pl. t. 272; Wt. Ic. tt. 782, 785.
N. Circars (Roxb.); Rampa Hills (Ramaswami, Narayanswami). Cultivated in most districts for the edible tubers. Spathe greenish-pink with pale blotches, purple at base within, appendage red-purple. Vern. *Hind.* Zamin-kand; *Tel.* Manshi-kanda. *Tam.* Karu-naik-kishangu; *Mal.* Karuna-kishannai, Muleshena.
2. AMORPHOPHALLUS DUBIUS, Bl.; F. B. I. vi. 514.
Malabar (Rheede).
Spathe green, limb purple, edges greenish, appendage chestnut-brown. Vern. *Mal.* Shena.
3. AMORPHOPHALLUS BULBIFER, Bl.; F. B. I. vi. 515.
Rampa Hills at 2,000 ft. (Narayanswami); Nadgani Ghát, S. Malabar (Bourne).
Spathe greenish or yellowish mottled pink without, pink or salmon deepening to scarlet within, appendage pale flesh-coloured or white, ♀ flowers red.
4. AMORPHOPHALLUS SYLVATICUS, Kunth. *Synantherias sylvatica*, Schott; F. B. I. vi. 518. *Arum sylvaticum*, Roxb.; Wt. Ic. t. 802.
Circars (Roxb.); Nilgiri-Wynaad (Beddome).
Spathe clouded, barred and streaked with green and pale-pink, appendage brown.
5. AMORPHOPHALLUS HOHENACKERI, Engl. *Raphiophallus*, Schott; F. B. I. vi. 518.
S. Kanara near Mangalore among bushes (Hohenacker).

13. *Plesmonium*, Schott.

Tuberous herbs. *Leaves* 1—3, appearing after the flowers; 3-foliate or -sect and pinnatisect. *Spathes* ovate, erect, convolute-campanulate below, expanded above. *Spadix* free, stipitate, included or exserted; appendage 0. ♂ and ♀ *inflorescences* separated by a dense belt of clavate, disciform or truncate neuters. *Perianth* 0. *Stamens* 1—6; anthers nearly sessile, cells subquadrate, immersed in the connective, opening by short, curved, apical pores. *Ovaries* slightly sunk in the spadix, 2—3-celled; styles conical; stigmas large, capitate or discoid; ovule solitary, axile. *Berries* ovoid, 2—3-celled and seeded. *Seeds* ellipsoid; albumen 0; embryo filling the seed.

PLESMONIUM MARGARITIFERUM, Schott; F. B. I. vi. 518. *Arum margaritifera*, Roxb.; Wt. Ic. t. 795.

Vizagapatam District (Barber); Rampa Hills at 1,500 ft. (Ramaswami, Narayanswami).

Tuber up to 4 in. diam.; leaf solitary, rarely 2, 12—18 in. diam.; leaflets narrowly lanceolate, acuminate, sometimes forked, 4—8 in. long; petioles 12—30 in. long; peduncles 1—2 ft. long; spathe broadly ovate, 3—5 in. long, leathery, green without, deep purple at the base within, sometimes flushed with purple upwards; ♀ inflorescence .75—1.5 in. long, neuters large, clavate, pure white, occupying a space of about .75 in., ♂ inflorescence 1.5—2 in. long.

14. *Anaphyllum*, Schott.

Tall herbs; rootstock creeping. *Leaves* hastate-sagittate when young, later pinnati- or pedati-sect; petioles very long. *Peduncles* long. *Spathes* oblong-ovate or lanceolate, base convolute or open, limb sometimes twisted. *Spadix* much shorter than the spathe, stipitate, cylindric; appendage 0. *Flowers* hermaphrodite, covering the whole spadix. *Perianth* of 4 truncate sepals incurved at the top. *Stamens* 4—6; filaments flat; anthers much shorter. *Ovary* ovoid, 1-celled; style thick, conical or almost absent; stigma disciform; ovule solitary, parietal, anatropous or semi-anatropous. *Berries* obovoid.

Mature leaves tristect usually not quite to the rib; up to 18 in. diam., the middle segment deeply pinnately lobed, the lateral pedately lobed; lobes linear-, oblong- or triangular-lanceolate, obtuse, acute or acuminate; petioles slender, very long; peduncles slender, up to 3 ft. long; spathes oblong-ovate or -elliptic, acute or obtuse and apiculate, 2—4.5 in. long, .9—2.25 in. wide, expanded from the base, not twisted; spadix 1—1.3 in. long.....1. *Beddomei*.

Mature leaves up to 2 ft. long, pinnatisect to or nearly to the midrib; leaflets often narrowed into a definite petiolule, sometimes sessile and shortly decurrent, apical leaflet sometimes 3-lobed, basal pair undivided, linear-oblong- or ovate-lanceolate, acute or acuminate, up to 20 in. long and 6 in. wide, lowest pair usually the largest; petioles 2—4 ft. long; peduncles about as long; spathes linear- to oblong-lanceolate, acuminate or caudate-acuminate, shortly convolute at the base, then expanded and lightly contorted, 8—16 in. long, 1.5—5.25 in. wide; spadix 1.5—3.5 in. long.....2. *Wightii*.

1. *ANAPHYLLUM BEDDOMEI*, Engl.

Anamalai Hills (Beddome, Fischer); Tinnevely and Travancore Hills, at about 4,000 ft.

Spathe 5—7-veined.

2. *ANAPHYLLUM WIGHTII*, Schott; F. B. I. vi. 551.

W. Gháts from the Attapadi Valley (Fischer) to Tinnevely and Travancore, 300—4,000 ft.

Spathe about 13-veined, dark-violet; smelling strongly of putrid flesh. Vern. *Mal.* Sulli.

15. *Lasia*, Lour.

Stout herbs; rhizome branched, spinous. *Leaves* hastate and entire or pedately pinnatifid, petioled. *Peduncles* long, spinous. *Spathes* very long, base convolute, blade much longer, twisted. *Spadix* short, sessile, cylindric, obtuse; appendage 0. *Flowers* hermaphrodite. *Perianth* of 4, rarely 6, obovate, truncate segments incurved at the tip. *Stamens* 4—6; filaments short, flat; anthers a little shorter. *Ovaries* ovoid, 1-celled; styles stout; stigmas depressed; ovules solitary, pendulous from the top of the cell, anatropous or semi-anatropous. *Berries* obpyramidal, hexagonal. *Seeds* compressed, rugose; albumen 0 or evanescent; embryo filling the seed.

LASIA SPINOSA, Thw. *L. heterophylla*, Schott; F. B. I. vi. 550; Wt. Ic. t. 777.

Rampa Hills at 2,500 ft. (Gamble, Narayanswami).

Rhizome thick; leaves 6—18 in. long, when young hastate or sagittate, acuminate, older often broader than long and deeply pedately pinnatifid, lobes linear-, elliptic- or oblong-lanceolate, acuminate, 1-ribbed, spinous on the nerves beneath; petioles

terete, 1—4 ft. long, spinous; peduncles as long; spathe 8—14 in. long, purple or claret, open only at the base; spadix 1—2 in. long; perianth-segments pink; berries densely, minutely muricate at the apex.

16. *Scindapsus*, Schott.

Stout shrubs climbing on trees and rocks by means of adventitious aerial roots. *Leaves* entire, alternate, distichous; petiole long, geniculate near the apex, often winged. *Peduncles* axillary, short. *Spathe* coriaceous, deciduous. *Spadix* sessile, cylindric, a little shorter than the spathe, dense-flowered; appendage 0. *Flowers* hermaphrodite. *Perianth* 0. *Stamens* 4—6; filaments short, flattened; anthers erect, longer than the filaments. *Ovary* obconic, truncate, 1-celled; stigma sessile, linear or elliptic; ovule solitary, basilar, anatropous. *Berries* confluent, pericarp with many inter-cellular needles. *Seeds* rounded, compressed; albumen 0; embryo filling the seed, horse-shoe-shaped.

SCINDAPSUS OFFICINALIS, Schott; F. B. I. vi. 541; Wt. Ic. t. 778.

Ganjam District (Gamble, Barber); Vizagapatam District (Jacob). *Leaves* ovate to suborbicular, inequilateral, 5—12 in. long, 2·5—6 in. wide, acuminate; petioles 3—6 in. long, more or less broadly winged to the knee, wing rounded or subcordate at the apex; spathe oblong with a cuspidate beak, 4—6 in. long, green outside, yellow within; spadix stout, nearly as long as the spathe, lengthening up to 9 in. in fruit, densely packed with prismatic, truncate ovaries. Vern. *Tel.* Enugu-tippali.

17. *Rhaphidophora*, Hassk.

Differing from *Scindapsus* only by the following characters: *Leaves* often pinnatipartite or pinnatisect, or if entire usually variously perforate; petioles not winged, but more or less sheathing at the base. *Anthers* much shorter than the filaments. *Ovary* sub 2-locular; style very short or elongate conical; ovules many. *Seeds* oblong; albumen copious; embryo axile.

RHAPHIDOPHORA PERTUSA, Schott; F. B. I. vi. 546. *Scindapsus pertusus*, Schott; Wt. Ic. t. 781.

In all Districts in hilly tracts in evergreen or moist deciduous forests; up to 4,000 ft.

Leaves ovate to suborbicular in outline, inequilateral, sometimes entire and if so perforate with elliptic holes, sometimes pinnatifid on one side to near the base and perforate on the other or more rarely completely pinnatifid to near the midrib, 8—12 in. long, 6—12 in. wide, apex shortly cuspidate, lobes few, unequal, dilated towards the oblique, falcate-acuminate margin; petioles deeply channelled above, 6—12 in. long; ovaries truncate; stigmas subsessile, pulvinate. Vern. *Tel.* Enugan-alleru; *Tam.* Anai-tippili; *Mal.* Anatippali; *Kan.* Dodda-tippali.

18. *Pothos*, Linn.

Evergreen branching shrubs climbing by adventitious aerial roots. *Leaves* distichous, simple, blade sometimes obsolete; petioles often

broadly winged and articulated to the blade. *Peduncles* axillary or terminal or on short lateral shoots. *Spathes* small, persistent, reflexed. *Spadix* sessile or stipitate, globose, obovoid, cylindric or filiform, often decurved. *Flowers* hermaphrodite, aggregated or distant. *Perianth* of 6 segments incurved at the tip. *Stamens* 6; filaments flat; anthers small. *Ovaries* ovoid, oblong or depressed, 3-celled; stigmas sessile, umbonate; ovules 1 in the inner angle of each cell, anatropous, ascending. *Berries* ellipsoid or obovoid, 1—3-seeded. *Seeds* compressed-ellipsoid, testa thick; albumen 0; embryo filling the seed.

Stems unarmed; spadix globose, ovoid or cylindric, dense-flowered, glabrous:—

Petioles broadly winged, wings truncate or rounded at the apex, narrowed to the semi-amplexicaul base, 1—2.5 in. long, .2—5 in. wide at the apex, in young shoots sometimes reduced to .2 in. long and .1 in. wide; blade of leaf usually lanceolate, sometimes linear-lanceolate, acuminate, rarely very broadly obovate and rounded, up to 4 in. long and 1.5 in. wide, often reduced to a mere point or altogether wanting, base rounded, veins close, forming a very acute angle with the mid-rib; peduncles axillary, solitary, .2—3 in. long, base embraced by a few minute, apiculate, suborbicular cataphylls; spathe suborbicular, apiculate, .1—2 in. long; spadix globose or obovoid, .25—3 in. long, deflexed; berries oblong, .5—7 in. long.....1. *scandens*.

Petioles not winged, channelled above, .2—7 in. long, very shortly sheathing; leaves elliptic- or oblong-lanceolate, cuspidate-acuminate, base narrowed, 4.5—7.5 in. long, 1.2—2 in. wide, veins nearly horizontal; peduncles from extra-axillary very short branchlets, solitary or 2—3 together, slender, .9—2 in. long, embraced by ovate to linear-oblong apiculate or obtuse cataphylls, the terminal up to .4 in. long; spathe linear- to broad-oblong, .6—1 in. long, acute or obtuse; spadix narrowly cylindric, .7—1.4 in. long; berries oblong, .4 in. long

2. *Thomsonianus*.

Stems armed at the nodes with 1-several straight or curved spinules up to .1 in. long; leaves linear- or elliptic-lanceolate, acute or acuminate, base narrowed, 3—5.6 in. long, .8—1.4 in. wide, veins prominent below, forming an obtuse angle with the midrib (about 45°); petioles .25—5 in. long, channelled above, shortly sheathing; peduncles 1.3—2.5 in. long, slender, usually curved, on short axillary branchlets embraced by several linear-oblong, blunt cataphylls, the terminal .3 in. long; spathe ovate-lanceolate, cymbiform, acute or obtuse, .5—7 in. long; spadix very slender, 1.5—2.3 in. long, furfuraceously brown-pubescent as are the flowers, straight or zig-zag; flowers in distant groups of 3—4.....3. *armatus*.

1. *POTHOS SCANDENS*, Linn.; F. B. I. vi. 551; Wt. Ic. t. 776.

W. Coast and Gháts, up to 2,500 ft.; growing on trees and rocks like ivy. Spadix yellow.

2. *POTHOS THOMSONIANUS*, Schott; F. B. I. vi. 555.

Wynaad (Beddome); Carnatic (G. Thomson); Travancore (Beddome, Lawson, M. Rama-Rao); Kannikatti, Tinnevely District (Herb. Madras).

3. *POTHOS ARMATUS*, Fischer in Kew Bull. 1929, 126.

Tambracheri Ghát, Malabar (Barber); Ponnudi to Kullar (Barber).

The spines are modified adventitious rootlets.

Family CLXVIII. LEMNACEAE.

Small or minute scale-like, green, gregarious, floating herbs, stemless, rootless or with capillary rootlets; propagating by budding or by hibernating bulbils, rarely by seed. *Fronds* smooth above, spongy below. *Flowers* very minute, monoecious, naked or enclosed in a

membranous spathe. *Perianth* 0. *Stamens* 1 or 2; anthers 1- or 2-celled. *Ovary* sessile, 1-celled; style short; stigma truncate or funnel-shaped; ovules 1—7. *Fruit* a flask-shaped utricle. *Seeds* 1—7; testa coriaceous; albumen fleshy or 0; embryo cylindric, axile.

Fronds flat above, with 1 or more roots; flowers in marginal clefts; anthers 2-celled.....1. *Lemna*.

Fronds minute, subglobose, rootless; flowers on the upper surface; anthers 1-celled, sessile.....2. *Wolffia*.

1. *Lemna*, Linn.

Fronds flat with 1 or more capillary rootlets from the margins or lower surface. *Flowers* in marginal clefts enclosed together in a transitory spathe; ♂ in pairs. *Stamens* solitary; filament filiform; anther 2-celled, globose. *Ovary* solitary; ovules 1—7. *Utricle* 1—7-seeded.

Rootlet solitary:—

Frond asymmetric, nearly flat on both surfaces, .12—25 in. long, root sheathed, appendaged; root-cap acute.....1. *paucicostata*.

Frond suborbicular or obovate in outline, flat above, convex below, .3—5 in. long; root-sheath elongate; root-cap acute.....2. *gibba*.

Rootlets several, tufted from the lower surface; fronds thick, orbicular or nearly so in outline, flat above, slightly convex below, .25—35 in. long, often purple below.....3. *polyrrhiza*.

1. *LEMNA PAUCICOSTATA*, Hegelm.; F. B. I. vi. 556.

In still waters in most localities.

2. *LEMNA GIBBA*, Linn.; F. B. I. vi. 556.

In still waters in all Districts.

3. *LEMNA POLYRRHIZA*, Linn.; F. B. I. vi. 557.

In still waters in all Districts.

2. *Wolffia*, Horkel.

Fronds very minute, subglobose, rootless. *Flowers* in a groove on the upper surface of the frond, naked; ♂ solitary. *Stamen* solitary; anther 1-celled, sessile. *Ovary* solitary; style short; stigma depressed; ovule solitary. *Utricle* spherical.

WOLFFIA ARRHIZA, Wimm.; F. B. I. vi. 557.

In still waters in all Districts.

Fronds .05 in. long or less.

Family CLXIX. TRIURIDACEAE.

Slender, leafless, saprophytic herbs devoid of chlorophyll. *Stems* simple or very little branched, filiform, bearing a few distant scales. *Flowers* monoecious or dioecious, small, in terminal corymbs or racemes; pedicels decurved, bracteate. *Perianth* 3—8-partite or -lobed, segments valvate in bud. *Stamens* 2—6, hypogynous or perigynous; anthers free or immersed in a thick disk, cells 2, confluent. *Pistillodes* 0 or 3, subulate. *Staminodes* in ♀ 0 or few. *Ovary* of many 1-celled carpels sessile on a receptacle; style terminal, lateral or basal, persistent; stigma acute, clavate or penicillate; ovule solitary, erect, anatropous. *Fruit* of several obovoid, coriaceous or fleshy achenes in a globose head; nucleus hard.

Sciaphila, Blume.

Perianth 3—8-partite or -lobed. *Anthers* sessile at the base of the perianth. *Styles* ventral or basal.

SCIAPHILA JANTHINA, Thw.; F. B. I. vi. 558.

Tinnevely and Travancore; 2,000—3,000 ft. (Beddome).

Stems 4—8 in. long; scales and bracts ovate-lanceolate, acuminate, up to 1 in. long; flowers monoecious or dioecious, long pedicelled, ♂ 12 in. diam., ♀ 25 in. diam.; perianth segments 8; anthers 4, sessile on a thick disk; style subbasilar, filiform, much longer than the ovary.

Family CLXX. ALISMACEAE.

Marsh or water plants, usually erect, sometimes floating, often with milky juice. *Leaves* radical or clustered at the nodes of floating stems, entire. *Flowers* regular, 1-sexual or hermaphrodite, in umbellate or paniculate whorls. *Perianth* of 6 segments in 2 series, the outer 3 herbaceous, the inner petaloid, rarely 0. *Stamens* 6— (rarely 3—) many, hypogynous or epigynous; anthers basifixed, erect. *Carpels* superior, 3—6 or more, 1-celled; sessile or stipitate on a flat or raised receptacle; style long, short or 0, subterminal or ventral; stigma simple; ovules 1—many in each carpel. *Fruit* of achenes or follicles. *Seeds* small; albumen 0; embryo straight or conduplicate.

Fruit indehiscent, of 3 or more achenes; ovule solitary, basal:—

Flowers all hermaphrodite.....1. **Alisma**.

Some or all of the flowers 1-sexual:—

Some of the flowers hermaphrodite; stamens 6; receptacle flat

2. **Limnophyton**.

All the flowers 1-sexual; stamens usually more than 6; receptacle oblong or globose.....3. **Sagittaria**.

Fruit dehiscent, of 6—9 follicles; ovules many on the inner wall

4. **Tenagocharis**.

1. Alisma, Linn.

Scapigerous herbs. *Leaves* lanceolate, cordate or sagittate. *Flowers* in umbelled or paniced whorls. *Sepals* persistent. *Petals* deciduous. *Stamens* 6 or 9. *Carpels* few-many; receptacle small. *Fruit* of small coriaceous or hard achenes. *Seeds* with a horse-shoe-shaped embryo.

Leaves coriaceous, reniform- or orbicular-cordate, apex rounded or retuse, basal sinus wide, 2.5—4.5 in. long, 2—6.5 in. wide, ribs 13—17, prominent, cross-nervules very numerous and close, straight; bracts at the lower forks less than .5 in. long; achenes 5—8, obovoid, long-awned with the persistent style, dorsally ridged, ridges smooth.....1. **reniforme**.

Leaves membranous, narrowly to broadly ovate-cordate, narrowed to a blunt apex, basal sinus narrow, 2.5—6 in. long, 1.2—3 in. wide, ribs 5—17, often slender, cross-nervules comparatively few and distant, not markedly straight; bracts at the lower forks 1—2.5 in. long, smaller upwards; achenes 2—6, ovate-reniform, style deciduous, dorsally ridged, ridges tubercled.....2. **oligococcum**.

1. ALISMA RENIFORME, Don; F. B. I. vi. 560; Wt. Ic. t. 322.

Mangalore (Wight).

Flowers white or pink-purple.

2. *ALISMA OLIGOCOCUM*, F. Muell.; F. B. I. vi. 560.
Paravur in Travancore (K. Venkoba Rao).
Flowers white.

2. *Limnophyton*, Miq.

Erect, succulent marsh herbs. Characters the same as those of *Alisma* except that there are ♂ flowers with 6 stamens in 2 series as well as the hermaphrodite ones with smaller stamens.

LIMNOPHYTON OBTUSIFOLIUM, Miq.; F. B. I. vi. 560.

In all Districts, more common on the Eastern side; sea-level to 6,000 ft.

Leaves reniform- or deltoid-sagittate, apex usually rounded, sometimes acute, basal sinus usually deep and wide, basal lobes spreading, long, tapering to a fine point, usually longer than the blade above the petiole, which is 1.5–6.5 in. long, 1.5–12 in. wide; petioles 4 in.—5.5 ft. long; panicle 1.4 ft. long; bracts at the forks whorled, broadly ovate-lanceolate, acuminate, up to 1 in. long; flowers numerous, .3–.5 in. diam., white, of the upper whorls ♂, of the lower ♀; achenes 12–20 in a globose head, obovoid, .15 in. long, irregularly 4-ridged, ridges indistinctly crenulate.

3. *Sagittaria*, Linn.

Erect aquatic herbs. *Leaves* erect or in deep water sometimes floating, cordate or sagittate. *Flowers* 1-sexual or polygamous, in paniced or spicate whorls. *Sepals* herbaceous, persistent. *Petals* membranous, deciduous. *Stamens* 6—many; filaments compressed. *Staminodes* often present in ♀ flowers. *Carpels* laterally flattened, crowded on a large globose or oblong receptacle; style ventral or apical; stigma papillose; ovule solitary, basal. *Fruit* a globose or oblong head of crowded, flattened, crested or winged achenes. *Seeds* erect, testa thin; embryo horseshoe-shaped.

Mature leaves hastate or sagittate, blade above the petiole 2–8 in. long, apex acute or acuminate, basal lobes usually diverging, narrower and often longer than the rest of the blade, tapering to a fine point; petioles up to 2 ft. long, trigonous; flowers .5–.75 in. diam., lower ♀ nearly sessile, with staminodes, upper ♂ with longer pedicels and about 24 stamens, ♂ rare; achenes obliquely obovate, apiculate, wing broad, entire or subcrenate. Young and floating leaves often strap-shaped or cordate-oblong.....1. *sagittifolia*.
Leaves broadly ovate, deeply cordate, apex rounded, 1–4 in. long, 1–3.5 in. wide, basal lobes rounded; petioles, scapes and pedicels often hairy; flowers .7 in. diam., lower ♀ with 9–12 stamens, upper more numerous ♂ with 6–12 stamens; achenes surrounded by a broad, prominently toothed wing.....2. *guayanensis*.

1. *SAGITTARIA SAGITTIFOLIA*, Linn.; F. B. I. vi. 561.
Nilgiris at 7,800 ft. (Lawson). Rare.
Petals white, the claw usually purple.
2. *SAGITTARIA GUAYANENSIS*, H. B. K.; F. B. I. vi. 561.
Nilgiris (G. Thomson); Quilon. Not common.
Petals white.

4. *Tenagocharis*, Hochst.

Marsh plants with milky juice. *Leaves* petioled, elliptic. *Flowers* hermaphrodite, in terminal single or superposed, bracteate whorls. *Sepals* herbaceous, persistent. *Petals* membranous, deciduous. *Stamens* 8—12; filaments filiform. *Carpels* 6—9, whorled, sessile on a flat receptacle; style short; ovules many, anatropous. *Fruit* of 6—7 erect, membranous follicles. *Seeds* numerous, minute, smooth; embryo conduplicate, horseshoe-shaped.

TENAGOCHARIS LATIFOLIA, Buchen. *Butomopsis lanceolata*, Kunth; F. B. I. vi. 562.

Ganjam District (Beddome, Barber).

Leaves elliptic-lanceolate, acute at both ends, 2—6 in. long, .65—2.25 in. wide; petioles up to 8 in. long, dilated at the base; scapes stout, usually longer than the leaves; bracts scarious, ovate, acute, up to .65 in. long; flowers .75 in. diam., 3—20 at the apex, sometimes with an additional whorl below; pedicels 1—6 in. long; petals white; follicles .35 in. long, shortly beaked, connate below.

Family CLXXI. APONOGETONACEAE.

Submerged or floating glabrous, aquatic herbs; rhizome tuberous or stoloniferous; tubers usually globose with numerous root-fibres. *Leaves* radical, rarely sessile, petioles with a sheathing base; blade oblong to linear-lanceolate, membranous, floating or submerged, with 3—7 or more longitudinal nerves and numerous transverse nervules. *Peduncles* long, emerging, bearing a simple or 2—4-branched spike. *Flowers* very small, actinomorphic, hermaphrodite, very rarely dioecious. *Perianth* of 1—3, generally 2, membranous, white or coloured sepals. *Stamens* 6 in 2 whorls, rarely more in 3 or 4 whorls; filaments free, filiform or subulate; anthers small, basifixed, 2-celled, subglobose or ellipsoid. *Carpels* free, usually 3, rarely 4—5 or in ♀ flowers 6—8, sessile, 1-celled, usually narrowed into a slender style; stigma discoid or linear, slightly decurrent; ovules 2—8, basal or 2-seriate on the ventral suture, ascending, anatropous. *Fruit* of 3 or more inflated, coriaceous, beaked follicles. *Seeds* 1—8, erect, oblong or cylindric; exalbuminous; testa herbaceous or fleshy, sometimes ribbed; embryo elongate, compressed or cylindric, erect.

Aponogeton, Linn. f.

The only genus. Characters of the Order.

Spike simple in all Indian species.

Leaves mostly floating, oblong to linear-lanceolate, acute or obtuse, base rounded or shallowly cordate, 1—8 in. long, up to 2 in. wide; spike 1—6 in. long, usually dense-flowered; sepals 2, obovate or suborbicular, .1 in. long; stamens as long or longer; follicles 3, subglobose; seeds 1—8, 6—8-ribbed, striate.....1. *natans*. *Leaves* all submerged, oblong to linear-oblong, rounded or subacute, base narrowed into the petiole, 7—20 in. long, sometimes much longer, up to 1.5 in. wide, margins undulate or crisped; spike 3—5 in. long, usually lax-flowered; sepals 2, obovate-spathulate, .17 in. long, much longer than the stamens; follicles 3, oblong, beaked; seeds 1—2, smooth.....2. *crispus*.

1. *APONOGETON NATANS*, Engl. & Kr. *A. monostachyon*, Linn. f.; F. B. I. vi. 564; Roxb. Cor. Pl. t. 81.
In all Districts; sea-level to 4,000 ft.
Sepals white, pink or pale-blue, anthers bluish-purple. Vern. Tel. Namma; Mal. Parua-kelanga.
2. *APONOGETON CRISPUS*, Thunb.; F. B. I. vi. 564.
Travancore (Rangachari); Madras (Bourne); Wynaad (Beddome).
Sepals white.

Family CLXXII. POTAMOGETONACEAE.

Freshwater or marine herbs, submerged or floating. *Leaves* distichous, alternate or less often opposite, sessile or petioled, often vaginate at the base, often stipulate. *Flowers* usually very small, emerging or submerged, solitary, spicate or cymose, hermaphrodite or monocious, actinomorphic. *Perianth* 0 or of 3-4 sepals, rarely cupular. *Anthers* sessile. *Carpels* 1-several, free or nearly so, 1-celled; stigmas 1 or 2; ovule solitary, usually pendulous from the apex and orthotropous, rarely parietal and anatropous. *Fruit* of coriaceous, subwoody or membranous drupelets. *Seeds* exalbuminous; embryo axile.

Flowers in erect, emerging, naked spikes; perianth of 4 sepals...1. *Potamogeton*.
Flowers submerged, solitary or in small cymes enclosed in the leaf-sheath or a spatheiform bract; perianth cupular or 0:—

Delicate herbs; leaves filiform; stigma single, peltate:—

Carpels 4, stipitate, ovoid, not keeled.....2. *Ruppia*.
Carpels 2-9, sessile, curved, sausage-shaped, dorsally keeled...3. *Zanichellia*.

More robust herbs; leaves strap-shaped or terete; stigmas 1-2, subulate:—

Anthers 2, inserted at the same level; stigmas 2.....4. *Cymodocea*.

Anthers 2, one inserted above the other; stigma 1.....5. *Diphanthera*.

1. *Potamogeton*, Linn.

Submerged or floating herbs; rhizome creeping. *Leaves* submerged or floating, linear, lanceolate, oblong or sometimes rotund, petioled or sessile, rarely amplexicaul. *Flowers* very small on spikes rising from a membranous spathe, hermaphrodite; bracts 0. *Perianth* of 4 concave, green sepals. *Anthers* 4, sessile at the base of the sepals; pollen globose. *Carpels* 4, sessile; stigma subsessile or decurrent, persistent. *Drupelets* small, coriaceous or membranous, often dorsally ridged. *Seeds* subreniform.

Upper or all the leaves floating, the latter petioled, none amplexicaul or semi-amplexicaul:—

Leaves all broad and petioled. Stem terete, branched; upper floating leaves sometimes opposite, thinly coriaceous, elliptic-lanceolate and acute or oblong or suborbicular and obtuse, base rounded or cuneate, 1.5-4 in. long, 1-2.5 in. wide, submerged leaves membranous linear- to elliptic-lanceolate, acute, up to 8 in. long and 1 in. wide, often undulate; petioles often very long; stipules free, up to 1.5 in. long; peduncles axillary or leaf-opposed, 1-6 in. long; spikes 1-1.5 in. long, dense-flowered; sepals .1 in. long, suborbicular, clawed; drupelets .1-.125 in. long, oblique, shortly beaked.....1. *indicus*.
Submerged leaves very narrowly linear or filiform without distinct petiole. Stems very slender; floating leaves membranous, elliptic- to ovate-oblong, acute, .5-1.5 in. long; petioles usually shorter than the blade; stipules free, .5-1 in. long;

peduncles slender, axillary or leaf-opposed; spikes 3—5 in. long, lax-flowered; sepals orbicular-obovate; drupelets semiglobose with a hooked beak, .08 in. long, ribs often toothed and tubercled.....2. *javanicus*.
 Leaves all submerged, without distinct petiole:—
 Stem rather stout, terete, slightly branched; leaves ovate-lanceolate, cordate, amplexicaul, obtuse, .75—1.5 in. long, .5—1 in. wide; stipules small, caducous; peduncles axillary, rather stout, 1—2 in. long; spikes dense-flowered, .5—1 in. long; sepals elliptic-obovate, clawed; drupelets compressed-globose with a short curved beak, hardly keeled, smooth, .1 in. long.....3. *perfoliatus*.
 Stem filiform, copiously distichously branched; leaves narrowly linear or filiform, acute, 1—6 in. long, .04—1 in. wide; stipules adnate to the leaf-sheath with free tips; peduncles slender, axillary, elongate; flowers interruptedly whorled on a spike .2—1.25 in. long; sepals suborbicular; drupelets dimidiate-obovate, shortly beaked, .1—1.5 in. long.....4. *pectinatus*.

1. POTAMOGETON INDICUS, Roxb.; F. B. I. vi. 565.

In all Districts; sea-level to 7,000 ft.

2. POTAMOGETON JAVANICUS, Hassk.; F. B. I. vi. 566.

Travancore; in backwaters.

3. POTAMOGETON PERFOLIATUS, Linn.; F. B. I. vi. 566.

Chingleput lake; Ootacamund lake (Gamble).

4. POTAMOGETON PECTINATUS, Linn.; F. B. I. vi. 567.

Chilka lake (Hooper, Annandale); Samalkota canal (Barber); Kistna District (Gamble); Coimbatore (Wight).

2. *Ruppia*, Linn.

Slender, much-branched herbs submerged in brackish water; rootstock creeping. *Leaves* alternate or subopposite, filiform; sheaths stipuliform. *Flowers* minute, hermaphrodite, peduncled within the leaf-sheath; peduncle elongating after flowering, ultimately straight or spirally coiled. *Perianth* 0. *Stamens* 2; anthers sessile, 2-celled. *Carpels* 4; stigma sessile, peltate; ovule pendulous. *Drupelets* 4, stipitate, ovoid, obtuse or beaked. *Seeds* pendulous, uncinat, embryo macropodal.

RUPPIA MARITIMA Linn.; *R. rostellata*, Koch; F. B. I. vi. 568.

Along the coasts.

Leaves 2—4 in. long; peduncles .25 to several inches long; stipes of drupelets up to 1 in. long; drupelets .08—1 in. long.

Subspecies *spiralis*, Linn. peduncles long and spirally coiled.

Subspecies *rostellata* Koch. peduncles .25—1 in. long, not coiled.

3. *Zanichellia*, Linn.

Submerged fresh- or brackish-water herbs; rootstock slender; stem filiform, cymosely branched. *Leaves* narrowly linear or filiform; stipular sheaths membranous. *Flowers* minute, monoecious, both sexes enclosed together in a membranous sheath. ♂ *perianth* 0. *Stamen* solitary; filament filiform; anther linear, 2—3-celled. ♀ *perianth* cupular, hyaline. *Carpels* 1—9, sessile or stipitate; style short or long; stigma peltate; ovule pendulous, orthotropous. *Drupelets* usually 4, coriaceous, compressed. *Seeds* pendulous, oblong, testa thin; embryo cylindric.

ZANICHELLIA PALUSTRIS, Linn. *subsp. PEDICELLATA* Syme; F. B. I. vi. 568.

Salt marshes and fresh-water lagoons.

Leaves 1—3 in. long, alternate or opposite; drupelets distinctly stipitate, compressed sausage-shaped, incurved, beaked, crested on the back.

4. *Cymodocea*, Koenig

Submerged marine herbs; rootstock rigid, jointed, creeping, branching, bearing the annular scars of fallen leaves. *Leaves* distichous, oblong, linear or terete; stipular sheaths membranous, mouth more or less 2-auriculate. *Flowers* axillary, monoecious, enclosed in membranous sheaths. *Perianth* 0. *Stamens* 2; anthers elongate, connate, stipitate, pollen in threads. *Carpels* 2, subsessile, ovoid, compressed; style short; stigmas 2, subulate; ovule pendulous, orthotropous. *Drupelets* 2, ovoid, coriaceous or woody. *Seeds* pendulous; embryo macropodal.

Leaves flat, flowers solitary:—

Leaf scars forming closed rings; leaves up to 8 in. long, .2 in. wide, apex rounded, usually entire, 7—13-nerved; sheaths compressed-cylindric, up to 2.5 in. long and .2 in. wide; drupelets with a coarsely, acutely dentate keel

1. *rotundata*.
Leaf scars forming open rings; leaves up to 8 in. long and .4 in. wide, apex rounded, minutely toothed, 11—19-nerved; sheaths obconic, 1—1.5 in. long, up to .4 in. wide at the mouth, much narrowed to the base.....2. *serrulata*.
Leaves fleshy, terete, grooved, tip 3-toothed, 3—6 in. long, .05 in. wide or less; sheaths narrowly obconic, up to 1.25 in. long and .2 in. wide at the mouth; flowers in terminal, dichotomously branched cymes 1—2 in. long, each pair sessile on a short peduncle enclosed in a spatheiform bract with a linear tail; bracts .2 in. long.....3. *isoetifolia*.

1. *CYMODOCEA ROTUNDATA*, Aschers. & Schweinf.

Pambam (Parthasarathy Iyengar); Tuticorin.

2. *CYMODOCEA SERRULATA*, Aschers. & Magn.; F. B. I. vi. 570.

Pambam (Parthasarathy Iyengar); Tuticorin (Wight).

3. *CYMODOCEA ISOETIFOLIA*, Aschers.; F. B. I. vi. 570.

Pambam (Parthasarathy Iyengar); Tuticorin (Wight, Thurston).

5. *Diplanthera*, Thouars

Submerged marine herbs; rootstock slender, branching, rigid, jointed, bearing the annular scars of fallen leaves. *Leaves* very narrowly linear, apex with 2 minute lateral teeth, 3-nerved; sheaths cylindric, distinctly 2-auriculate and ligulate. *Flowers* axillary, monoecious. ♂ *peduncles* long. *Anthers* equal, sessile, one inserted above the other by about half its length. *Carpels* included in the sheath with the single subulate style exerted. *Drupelet* subrotund-ovate, slightly compressed.

DIPLANTHERA UNINERVIS, Aschers. *Cymodocea australis*, Trim.; F. B. I. vi. 570.

Ennore backwater (Thurston); Tuticorin.

Leaves 3—7 in. long, .1—1.6 in. wide, apex between the teeth truncate or rounded, the midnerve often shortly excurrent to form a third tooth; anthers .12 in. long; drupelets .12 in. long.

Family CLXXIII. NAJADACEAE.

Slender, submerged, salt- or fresh-water herbs; stems rooting from the nodes, branched, filiform, smooth or muricate. *Leaves* alternate, opposite or ternate, linear, entire or minutely spinulose-serrulate; base sheathing, sheaths truncate, rounded or 2-auriculate at the apex margins more or less toothed. *Flowers* minute, axillary, solitary or a few together, monoecious, rarely dioecious, naked or enclosed in a tubular or inflated spathe. *Perianth* 0 or tubular and hyaline. *Stamen* 1, adnate to the perianth, 1—4-celled. *Carpel* 1, sessile; style cylindric; stigmas 2—4, slender; ovule solitary, basal, erect, anatropous. *Achenes* oblong or ellipsoid. *Seeds* erect, testa very thin, areolate; embryo straight, macropodal.

Najas, Linn.

The only genus. Characters of the Order.

(The key and characters below have been adapted from Rendle's monograph in 'Pflanzenreich,' iv. 12.)

Flowers of both sexes devoid of spathe. Shoots a few inches to over 2 ft. long; leaves .6—1 in. long, .16—25 in. wide, marginal spinules minute, numerous; auricles of the sheath elongate, about $\frac{1}{2}$ the length of the sheath, toothed; flowers solitary or 2—4 together; ♂ perianth ending directly above the anther in 2 ear-like lobes; fruit ellipsoid-oblong, attenuate at the apex, .07—09 in. long; areoles minute, subquadrate or polygonal.....1. *graminea*.
At least the ♂ flowers enclosed in a spathe:—

Flowers of both sexes in a spathe. Shoots very slender; leaves .8—1.6 in. long, .2 in. or less wide, marginal spinules few, often as long as the width of the leaf; auricles of sheath variable, truncate or lobed, never elongate; spathe of ♂ narrowed into an irregularly toothed mouth ending in 2 opposite linear prolongations 1—2-spined at the apex; perianth closely investing the anther; spathe of ♀ with a neck $\frac{1}{4}$ — $\frac{1}{2}$ its length, mouth spinulose; fruit ellipsoid, enclosed in the persistent spathe, .08 in. long; areoles quadrate.....2. *indica*.
Spathe absent from ♀ flowers:—

Anthers 1-celled. Shoots 1.5—10 in. long; leaves tapering, .4—1 in. long, .12—2 in. wide, margins with a few broad-based, up-curved spinules; sheaths broad, usually truncately rounded with a few prominent teeth on the shoulders; spathe of ♂ ellipsoid, elongate below, ending above the perianth in a short cylindrical neck; perianth closely investing the anther; fruit ellipsoid, .08—1.2 in. long; areoles in the shape of ladder-like pits

3. *minor*.

Anthers 4-celled:—

Apex of the spathe cut into deep irregular segments bearing 1 or more brown spinules. Shoots dichotomously branched, up to 6 in. long; leaves up to 1 in. long and .02 in. wide, spinules few, the dorsal keel sometimes spinulose; auricles of sheath rather broad, the apex cut into 2—4 deep spiny teeth.....4. *lacerata*.

Spathe ellipsoid, apex not lacerate. Leaves .6—8 in. long, .025 in. wide, marginal spinules numerous; auricles of sheath often falcately curved, with a few teeth along the outer edge, inner edge entire; fruit .8 in. long; areoles minute, quadrate.....5. *falciculata*.

1. *NAJAS GRAMINEA*, Del.; F. B. I. vi. 569.

Cuddapah and Anantapur Districts, up to 3,000 ft. (Gamble); Madras (Wight).

Var. *minor*, Rendle. Smaller and more delicate; leaves .28—.64 in. long; auricles of sheath shorter; fruit .04—.06 in. long. Tuticorin (Wight).

2. *NAJAS INDICA*, Cham.
Tranquebar (Klein.)

3. *NAJAS MINOR*, All. ; F. B. I. vi. 569.
Horsleykonda at 4,000 ft. (Gamble); ponds in Ootacamund
Gardens at 7,500 ft. (Gamble).

Var. *spinosa*, Rendle. Leaves very narrow, marginal spinules as
long as the width of the leaves or nearly so; fruit .06—.07 in. long.
Godavary District (Gamble); Madras (Wight).

4. *NAJAS LACERATA*, Rendle.
Madras (Wight); Tinnevely (Beddome).

5. *NAJAS FALCICULATA*, A. Braun ; F. B. I. vi. 569.
Madras (Wight).

Family CLXXIV. ERIOCAULACEAE.

Annual or perennial scapigerous, marsh (less frequently aquatic) herbs. *Stem* usually simple, often very short or 0. *Leaves* radical or, in aquatic species, cauline, usually narrow and grass-like, base sheathing, veins parallel. *Flowers* minute, unisexual, densely packed in a solitary, globose, hemispheric subglobose or discoid head surrounded by an involucre of bracts terminating a usually ribbed peduncle with a basal sheath. *Heads* androgynous, rarely unisexual, but often with a preponderance of one sex; receptacle naked or pilose, flat, convex, hemispherical, conical or columnar; flowers solitary in the axil of a bract. ♂ *flower* stipitate; sepals 2 or 3, free or more or less connate or spathaceous and split down one side, equal or often one smaller and differently shaped, sometimes winged on the back; petals usually united into a cylindric or funnel-shaped lobed or truncate tube, one lobe sometimes much larger than the rest, rarely free, each lobe usually bearing a black subapical gland; stamens 4 or 6, usually in 2 series, filaments filiform, anthers 2- or 4-celled, usually black, sometimes white or yellow. ♀ *Flower* sessile or stipitate; sepals usually free, rarely more or less connate, usually 2 or 3, rarely 1 or 0; petals 3, free (rarely 0), usually pilose and bearing a black gland at the apex; ovary superior, sessile or shortly stipitate, 2—3-celled, cells 1-ovuled, style single, usually short, stigmas as many as the cells of the ovary, usually long and single, sometimes 2-fid. *Seeds* pendulous, minute, oblong or ellipsoid, brown, testa thin, often with rows of white papillae, smooth or reticulate and often more or less ribbed; albumen farinaceous; embryo minute.

Eriocaulon, Linn.

Characters of the Order. *Stem* when present always simple, usually short or 0. *Peduncles* often twisted, glabrous or hairy. ♂ *flowers*: lobes of the corolla always present though often minute, 1 often enlarged and sometimes protruding beyond the floral bract, usually bearing an apical black, rarely red, gland. ♀ *flowers*: petals very rarely absent, rarely less than 3, always free. In many species the floral bracts and the sepals are furnished with peculiar white or

yellowish cylindrical, blunt, opaque hairs which resemble elongate papillae; in the key these are termed papillose-hairs.

N.B.—*The flowers are very apt to vary; sometimes 2 and 3 sepals are found in the different flowers of the same head; black and white anthers have been seen in the same head; there is often considerable variation in the indumentum, from glabrous to almost densely hairy. In older flowers the originally spathaceous calyx is apt to split into its component sepals, consequently great care is needed in dissection, especially when examining herbarium specimens.*

Water-plants, only peduncles emerging; stems submerged, up to 3 ft. long, with many capillary, flexuous, 1-nerved leaves 1·5–2 in. long; peduncles numerous, umbellate on the apex of the stem, 1·5–4 in. long; sheath up to 1 in. long, mouth oblique; heads subglobose, 12–16 in. diam., dark-brown and glabrous or pale-green and white-puberulous at the apex; receptacle villous; ♂ calyx spathaceous, split down the front, anthers black; ♀ sepals 3, obovate, cymbiform, petals linear or linear-spathulate, pilose, usually with an apical black gland

1 *setaceum*.

Terrestrial or marsh plants; stems very short or 0; leaves radical:—

Leaves linear-oblong, apex rounded and cuspidate, 1–3·5 in. long, 16–25 in. wide, glabrous; peduncles few to many, 6–12 in. high, 7-ribbed; sheaths up to 4 in. long, glabrous, mouth oblique; heads subglobose, 16–25 in. diam.; bracts broadly obovate-cuneate, obtuse, glabrous, the floral slightly narrower; receptacle glabrous; ♂ sepals 2, free, obovate-lanceolate, hyaline, slightly winged and puberulous near the apex, corolla lobes unequal, anthers black; ♀ sepals 2, elliptic-lanceolate, acute, with a pubescent, rounded crest-like wing on the back, petals 3, unequal, narrowly linear-lanceolate, apex villous and with a conspicuous black gland.....2. *cuspidatum*.

Leaves not linear-oblong, apex not rounded:—

All the bracts much longer than the flowers and stellately spreading. Leaves linear-ensiform, subacute, 1–3 in. long, 25–5 in. wide, glabrous or slightly hairy; peduncles 2–8 in. high, 4-ribbed, more or less hairy with spreading hairs; sheaths 1–1·5 in. long, glabrous or slightly hairy near the base, mouth oblique, long acuminate; heads globose, 25–35 in. diam., stellately echinulate from the long, spreading, glabrous bracts, the involucre lanceolate, scarious, the floral narrower, hyaline; receptacle pilose; ♂ sepals 2, free or connate, obliquely ovate, glabrous, hyaline, anthers black; ♂ sepals 3, falcately ovate with a long subulate acumen, dorsally crenately winged, glabrous, white, petals 3, linear-spathulate, pilose, with an apical black gland; seeds oblong-subglobose, dark brown.....3. *stellulatum*.

Floral bracts not much longer than the flowers, not stellately spreading:—

Floral bracts conspicuously regularly imbricating, closely appressed and concealing the flowers:—

Peduncles many; heads conical or hemispheric, base usually truncate, 13–38 in. diam., up to 3 in. high. Stem short, thick; leaves linear or linear-ensiform, glabrous, 3–12 in. long, up to 1 in. wide at the base; peduncles stiff, up to 22 in. high, 4–5-ribbed, glabrous; sheaths 3–6 in. long, mouth oblique, long acuminate; involucre bracts orbicular or obovate, glabrous, yellow, shining; floral bracts cuneate-obovate, triangular-cuspidate, white-pubescent in the upper half; receptacle globose, columnar or hemispheric, sparsely hairy; ♂ sepals 2, usually more or less connate, boat-shaped, winged, glabrous; ♀ sepals 3, free, glabrous, 2 boat-shaped and broadly winged on the back, 1 smaller, linear, flat, petals 3, much shorter, linear, with an apical tuft of long hairs, eglandular; seeds subglobose, longitudinally ribbed, ribs white-papillose

4. *sexangulare*.

Peduncle solitary; head depressed-globose, 5 in. diam. Stem very short, thick, woolly; leaves equitant, ensiform, acute, minutely papillose, sparsely pilose below, about 20-nerved, up to 10 in. long and 1 in. wide at the base; peduncle 16 in. long, about 10-ribbed, glabrous; sheath 10 in. long,

externally sparsely pilose, mouth oblique, acute; involucre bracts obovate, glabrous, pale-brown, the inner ones darker; floral bracts rhomboid- or obovate-cuneate, acute, dark-grey, upper part inflexed, white papillose-hairy on the black; ♂ sepals 2, free or nearly so, obovate, apex densely white papillose-hairy, corolla-lobes with a black ensiform gland and a tuft of white papillose hairs; stamens black; ♀ sepals 2, free, boat-shaped, densely white-silky in the upper half, petals 3, linear, silky-pilose, apex with a black gland and a tuft of white papillose-hairs, stigmas overtopping the petals.....5. *ensiforme*.

Floral bracts not conspicuously regularly imbricating:—

One ♂ petal larger and extruded beyond its floral bract:—

Heads .5 in. diam. or larger, subglobose. Stem short, thick, silkily woolly; leaves ensiform, acute or subacute, glabrous, striate, glaucescent, many-nerved, 2—12 in. long, up to 1.25 in. wide at the base; peduncles solitary, rarely 2, glabrous, many-ribbed, up to 3 ft. long; sheath lax, usually rather longer than the leaves, mouth very oblique, subacute, often lacerate; involucre bracts ovate-lanceolate, acute or subacute, glabrous, olivaceous; floral bracts cuneate-oblong, long acuminate, olive-grey, dorsally long-pilose in the upper half; receptacles pilose; ♂ sepals 3, nearly free, dark-green, spatulate-oblong, keeled, pilose, corolla-lobes rather large, apex with a black gland and densely papillose-hairy; anthers black; ♀ sepals 3, free, narrowly obovate-oblong, dark-olive, pilose, petals 3, free, unequal, spatulate-oblong, pilose, with an apical black gland.....6. *robustum*.

Heads less than .4 in. diam:—

Mouth of sheath distinctly oblique:—

Floral bracts oblanceolate, conspicuously caudately cuspidate, very black, dorsally more or less white papillose-hairy near the apex. Leaves narrowly linear-ensiform, acute or acuminate, glabrous, 1—5 in. long, .05—1.5 in. wide; peduncles 1-many, 3—20 in. long, 6-ribbed, glabrous; sheaths close, as long as the leaves, glabrous, acute, sometimes lacerate; heads globose, dark or ashy; involucre bracts obovate, rounded, scarious, blackish, shining; receptacle convex, shortly villous; ♂ sepals 3, free, nearly black, apex hairy, anthers black; ♀ sepals 3, free, narrow, nearly black, more or less whitish hairy, petals 3, narrowly oblanceolate, pilose, with a small black apical gland.....7. *longicuspis* var. *polycephala*.

Floral bracts obovate-cuneate, rounded or acuminate, not caudate, yellowish-brown, sparsely hairy. Leaves linear-ensiform, acute, 1—3 in. long, up to .2 in. wide, glabrous; peduncles few-many, glabrous, 5—6-ribbed, slender, 4—12 in. high; sheaths as long as the leaves, close; heads subglobose, .15—.2 in. diam.; involucre bracts broadly obovate, rounded, glabrous, straw-coloured or pale-brown; receptacle more or less pilose; ♂ sepals 3, free or connate into a spathe split down the front, obovate-lanceolate, glabrous or more or less hairy near the apex, one sometimes flatter, narrower and acute; ♀ sepals 2, rarely 3, boat-shaped, acute, glabrous or with a few papillose hairs at the apex, petals 3, linear, hairy, with an apical black gland, 1 slightly longer than the rest...8. *odoratum*.

Mouth of sheath truncate or nearly so, rarely somewhat oblique, often lacerate, narrowly scarious. Leaves linear, acuminate, glabrous, 3—7-nerved, .5—3 in. long; peduncles 1—4, glabrous, 5—8-ribbed, 1—8 in. high; sheaths close, usually a little shorter than the leaves, glabrous; heads globose, black and densely snowy-white papillose-hairy, .18—3.5 in. diam.; involucre bracts broadly obovate, rounded or subacute, black, glabrous; floral bracts cuneate-obovate, cuspidate, black, outermost nearly glabrous, inner with an inflexed and densely snowy papillose-hairy apex; receptacle conical or subglobose, glabrous, ♂ sepals 3, more or less united into a spathe split down one side, obovate, concave, nearly black, apex densely white papillose-hairy, corolla-lobes white papillose-hairy and with a black apical gland, anthers yellow turning black; ♀ sepals 3, free, elliptic to obovate,

boat-shaped, acute, black, apex white papillose-hairy, petals 3, linear-spathulate, pilose and with an apical black gland.....9. *metaleucum*.

♂ petals equal or nearly so, none extruded beyond the floral bract; mouth of sheaths oblique:—

Plant more or less hairy, the involucre bracts at least pubescent:—

Heads .35—1 in. diam.:—

Involucre bracts black or dark-brown, obovate, rounded or subacute, base often brown-woolly. Leaves linear or linear-ensiform, acuminate, long-hairy on both faces, up to 20 in. long and .75 in. wide; peduncles usually several, hairy, 5—8-ribbed, up to 36 in. long; sheaths as long as the leaves, hairy, close, acute; heads globose, .5—1 in. diam. or more; floral bracts obovate or spatulate cuneate, acute or subacute, dark-olive, apex densely white papillose-hairy; receptacle flat or convex, pilose; ♂ calyx spathaceous, split down one side, lobes 3, acute, dark olive, apex white papillose-hairy, corolla-lobes triangular-ligulate, apex white papillose-hairy and with a black gland; ♀ sepals 3, free, deeply boat-shaped, base usually subacute, keeled, apex densely white papillose-hairy, petals linear-spathulate, pilose, with an apical black gland; seeds subglobose, dark-brown, finely reticulate.....10. *Brownianum* var. *nilagirensis*. Involucre bracts straw-coloured or pale-brown, obovate or obovate-oblong, rounded, inner acute, pale-brown silky at least at the base. Leaves linear or ligulate, apex attenuate, obtuse or subacute, glabrous, up to 20 in. long and 1 in. wide; peduncles several to many, twisted, stout, 6—9-ribbed, glabrous or sparsely hairy, up to 31 in. high; sheath lax, glabrous or more or less hairy, mouth very oblique, acuminate; heads globose, snowy, appearing echinate through the prominent floral bracts, which are cuneate-obovate, caudate-acuminate, pale or dark grey-green, apex densely white papillose-hairy; receptacle narrowly columnar, pilose, ♂ calyx spathaceous, split down one side, dark, lobes 3, short, rounded, apex white papillose-hairy, corolla-lobes triangular-ligulate, apex white papillose-hairy and with a black gland, anthers black; ♀ sepals 3, free, oblanceolate-oblong, concave or nearly flat, often keeled, apex densely white papillose-hairy, petals 3, oblanceolate-oblong, shortly clawed, hairy, with or without an apical black gland; seeds subglobose, red-brown, with a few longitudinal white-fenestrate ribs.....11. *robustum*-*Brownianum*.

Heads not exceeding .25 in. diam.:—

Bracts whitish. Leaves linear-lanceolate or ligulate, apex attenuate; subacute, glabrous, 1—2.5 in. long, .2—5 in. wide; peduncles few, slender, shallowly 6-ribbed, glabrous, 3—8 in. high; sheaths lax, glabrous, 1—2.25 in. long, acute; heads subglobose; involucre bracts broadly obovate or quadrate, obtuse, scarious, hairy upwards and ciliate at the apex; floral bracts cuneate-oblong, obtuse, dorsally hairy; receptacle villous; ♂ calyx spathaceous, split down one side, truncate, glabrous or nearly so, corolla-lobes minute, with an apical black gland, glabrous, anthers black; ♀ sepals 3, free, deeply boat-shaped, 1 sometimes winged on the back, 1 sometimes flat, petals 3, spatulate, pilose, with an apical black gland; seeds broadly oblong, reddish-brown, slightly ribbed.....12. *lancoelatum*. Involucre bracts blackish or dark-brown, floral bracts greenish-brown. Leaves linear-lanceolate, obtusely acuminate, glabrous, 3—5 in. long; peduncles several, glabrous, acutely 4—5-ribbed, 5—10 in. high; sheaths half as long as the peduncles, widened and lax in the upper half, glabrous, long acuminate; heads cylindric-globose, .15—.2 in. diam.; involucre bracts semi-circular, dorsally white powdery-pubescent; floral bracts rhomboid- or cuneate-obovate, apex inarched, acute, white powdery-pubescent, receptacle large, ellipsoid, more or less pilose; ♂ sepals 2, free, narrowly boat-shaped, olive, curved, powdery-puberulous upwards, corolla-lobes minute, papillose, with or without a black apical gland, anthers black; ♀ sepals 2, free, olive, falcate-ovate or semirhomboid, boat-shaped, apiculate,

keel winged, white powdery-pubescent upwards, petals 3, linear-spathulate, pilose, with or without a black apical gland

13. *Vanheurckii*.

Plant and involucre bracts quite glabrous:—

Anthers white or yellow:—

Bracts pale; ♀ petals 0. Leaves capillary or very narrowly linear, finely acuminate, 4—2 in. long; peduncles numerous, slender, faintly ribbed, 6—6 in. high; sheaths shorter than the leaves, acute; heads 1—2 in. diam., whitish or purplish; involucre bracts scarious, outer broadly obovate-oblong, inner narrower, apex of all rounded; floral bracts linear-oblong to oblanceolate, obtuse or subacute, glabrous, hyaline, shining, often with a central purplish zone; receptacle columnar, glabrous or nearly so; ♂ calyx spathaceous, split down one side, apex 3-toothed, glabrous, corolla-lobes minute, glabrous, with an apical black gland; ♀ sepals usually 2, sometimes 0, 1 or 3, free, narrowly linear or filiform, acute, glabrous, hyaline; seeds oblong-globose, reddish-brown, apex shortly mucronate and darker, finely transverse-striate.....14. *Sieboldianum*.

Bracts black; ♀ petals 3. Leaves linear, acuminate, 4—7-nerved, transverse venules usually conspicuous, 1—3 in. long, .05—1 in. wide; peduncles several, not ribbed, transverse venules usually visible, 4—10 in. high; sheaths close, usually a little longer than the leaves, transverse venules conspicuous, acute, often divided into 2—5 segments; heads subglobose, .15—2 in. diam., black, the apex with white indumentum; involucre bracts suborbicular or obovate-oblong, rounded; floral bracts obovate-lanceolate, boat-shaped, acute or cuspidate, white papillose-hairy at the apex on the back; receptacle conical or subhemispheric, glabrous; ♂ calyx spathaceous, split down one side, truncate or obscurely 3-lobed, blackish upwards, apex more or less densely white papillose-hairy, corolla lobes white papillose-hairy and with an apical black gland; ♀ sepals 3, free, oblong or obovate, boat-shaped, greenish-black, truncate or rounded, denticulate, apex white papillose-hairy, petals 3, linear-spathulate, usually longer than the sepals, pilose, with a large apical black gland; seeds subglobose, brown, angular.....15. *Ritchieanum*.

Anthers black or dark green:—

Involucre bracts hyaline:—

Leaves narrowly linear or setaceous, 1—2 in. long; peduncles several, slender, striate, 2—4 in. long; sheaths shorter than the leaves, acute; heads conic-subglobose, .06 in. diam., whitish; involucre bracts obovate-oblong, rounded or subacute; floral bracts narrowly obovate, acute, hyaline, glabrous or subpubescent; receptacle shortly columnar, villous; ♂ calyx spathaceous, split down one side, 3-lobulate, glabrous, silvery-grey, corolla-lobes small, with an apical black gland; ♀ sepals 3, narrowly boat-shaped, acute, hyaline, glabrous, with a spongy wing on the middle of the back, petals 3, linear, glabrous, ciliate, eglandular; seeds oblong-subglobose, one side nearly straight, brown.....16. *Margaretæ*. Leaves linear, up to 2 in. long and .1 in. wide; peduncles many, slender, striate, up to 6 in. high; sheaths shorter than the leaves, striate, acute, often split; heads conic-subglobose, .1 in. diam., whitish; involucre bracts lanceolate, acute or subacute; floral bracts obovate, cuspidate or caudate, pale straw-coloured or darkish-grey, glabrous or sparsely white-hairy; receptacle columnar, villous; ♂ calyx spathaceous, split down one side, lobes ovate or obovate, acute, sparsely white-ciliate, darkish, corolla-lobes glabrous, with or without an apical black gland; ♀ sepals 3, free, boat-shaped, hyaline, 2 broadly winged, the third narrower and not winged, all more or less ciliate, petals 3, linear, apex pilose, eglandular.....17. *Elenoræ*.

Involucre bracts not hyaline:—

Floral bracts glabrous or nearly so:—

Leaves ensiform, subacute, or obtusely acuminate, .5—2.25 in.

long, .05—.13 in. wide; peduncles many, shallowly 5—8-ribbed, 2—10 in. high; sheaths shorter than the leaves, lax upwards, acute; heads hemispheric, .1—1.5 in. diam.; involucre bracts broadly obovate, rounded or truncate, pale straw-coloured, scarious; floral bracts spatulate-obovate, concave, rounded or shortly acute, glabrous or sparsely puberulous, subhyaline; receptacle narrowly conic, glabrous; ♂ sepals 2, connate on one side by half their length, obovate, concave, rounded or truncate, glabrous or slightly puberulous, corolla-lobes glabrous or puberulous, with or without a black apical gland; ♀ sepals 2, free, linear or spatulate, obtuse, hyaline, glabrous or sparsely puberulous, petals 3, narrowly oblanceolate, glabrous or nearly so, with or without an apical black gland; seeds ellipsoid, brown, longitudinally few-ribbed.....18. *truncatum*.
Leaves very narrowly linear or filiform, acuminate, base dilated, .5—.75 in. long; peduncles numerous, capillary, striate, 1—2 in. high; sheaths shorter than the leaves, lax, acute; heads campanulate, white, shining, .1 in. diam.; involucre bracts ovate-lanceolate, acute or acuminate; floral bracts shorter, oblanceolate, acute or cuspidate; receptacle small, columnar, glabrous or sparsely villous; ♂ calyx spathaceous, split down one side, irregularly 3-toothed, pale, glabrous; ♀ sepals 2, free, boat-shaped, falcately curved, spinulose-winged or -keeled on the back, glabrous, rarely a third filiform present, petals 0

19. *minutum*.

Floral bracts pilose or distinctly pubescent:—

Leaves densely rosulate, pectinate, linear-lanceolate, acute, slightly concave above, .4—7 in. long, .1 in. wide at base; peduncle solitary, 2—2.5 in. long; sheath lax, as long as the leaves; heads subglobose, .15—.2 in. diam.; involucre bracts broadly obovate, conspicuous, yellowish; floral bracts obovate, cuspidate, keeled, hairy at the apex; ♂ calyx spathaceous, nearly truncate or shortly 3-cuspidate, ciliolate, corolla-lobes with a black apical gland; ♀ sepals 3, free, oblong-ovate, sub-obtuse, brown upwards, ciliate, petals 3, oblong-cuneate, with an apical black gland.....20. *pectinatum*.

Leaves not rosulate nor pectinate:—

Involucre bracts lanceolate, much longer than the floral bracts and the flowers:—

Floral bracts oblong-obovate, truncate or rounded, hyaline, apex shortly white-hairy. Leaves linear-lanceolate, acute or acuminate, 7—11-nerved, .2—1.5 in. long, .06—.16 in. wide at base; peduncles several striate, .3—2.5 in. high; sheaths lax, up to 1 in. long, acute; heads hemispheric, small, few-flowered; involucre bracts acuminate, scarious, pale-yellow or nearly white, glistening; receptacle glabrous or nearly so; ♂ sepals 3, free or more or less connate into a split spathe, obovate-cuneate, truncate or obtuse, dark, apex white papillose-hairy, corolla-lobes minute, glabrous, apical black gland minute; ♀ sepals 2, rarely 3, linear, when 3 one narrower, apex dark with pubescent tip, petals 3, oblanceolate, tip hairy with a black gland; seeds narrowly oblong, yellow, with longitudinal rows of white papillae

21. *xeranthemum*.

Floral bracts obovate-cuneate, cuspidate, dark-green, apex white papillose-hairy. Leaves linear, apex narrowed, sub-acute, .15—.4 in. long, .25 wide; peduncles many, striate, 2.5—7 in. long; sheaths lax, half as long as the leaves, obtuse; heads hemispheric, .2—2.5 in. diam.; involucre bracts acute or obtuse, straw-coloured; receptacle small, conical, pilose; ♂ calyx spathaceous, split down one side, lobes 3, small, rounded, apex white papillose-hairy, corolla-lobes white papillose-hairy at the tip with a black gland;

♀ sepals 3, free, dark, 2 narrowly boat-shaped, white-puberulous in the upper half, 1 flat, linear-spathulate, tip white-hairy, petals 3, linear-oblanccolate, pilose, eglandular

22. *Dianae*.

Involucral bracts not longer than the floral bracts and the flowers:

♂ calyx spathaceous, split down one side, 3-lobed or partite:—

Sepals white or nearly so. Leaves linear-ensiform, acute or acuminate, 5—11-nerved, purplish beneath, often drying red, .5—4 in. long, up to .5 in. wide; peduncles numerous, 5-ribbed, 1—11 in. high; sheaths lax, shorter than the leaves, often purplish, obtuse; heads globose ovoid or hemispherical, grey or snow-white, .16—.25 in. diam.; involucral bracts obovate, very obtuse, scarious, glistening, eventually reflexed and often concealed under the head; floral bracts obovate or oblanceolate, acuminate or cuspidate, dark or pale, hairy near the apex; receptacle globose or columnar, sparsely pilose; ♂ calyx-lobes oblong, apex white papillose-hairy, corolla-lobes linear, apex white papillose-hairy, with or without a black gland; ♀ sepals 3, free, linear-spathulate, hyaline or nearly so, apex hairy, petals narrowly oblanceolate, pilose, apex with a black gland; seeds oblong-ellipsoid, pale-brown, smooth or with a few transverse striae.....23. *quinquangulare*.

Sepals dark:—

Heads subglobose:—

Leaves linear or ensiform, obtuse or acuminate, .2—3.5 in. long; peduncles few—many 5—8-ribbed, .7—16 in. high; sheaths lax, as long as the leaves, obtuse, often split; heads subglobose, black, .15—.25 in. diam., involucral bracts obovate or suborbicular, rounded, black or dark brown; floral bracts cuneate-obovate, acute or cuspidate, nearly black, more or less pubescent near the apex; receptacle small, hemispherical, pilose; ♂ calyx spathaceous, split down one side, lobes, obovate, more or less white papillose-hairy at the apex and with a black gland; ♀ sepals 3, free, all boat-shaped or 1 flat, dark green, white papillose-hairy near the apex, petals spathulate, pilose, with an apical black gland; seeds oblong-subglobose, brown, finely transverse-striate, often white-papillose

24. *collinum*.

Leaves ligulate, narrowed to an obtuse apex, many-nerved, 2—12 in. long, .15—.6 in. wide at base; peduncles many, about 8-ribbed, 4—15 in. high; sheaths lax, up to 3 in. long, obtuse; heads .1—.25 in. diam. involucral bracts lanceolate or ovate, acute or subacute, pale; floral bracts cuneate- or oblong-obovate, cuspidate, dark green, apex white, hairy.

Other characters as in last the species.

22. *Dianae* var. *Richardiana*.

Heads distinctly conical with a flat base, .1—.15 in. diam. and up to .2 in. high. Leaves linear, up to 1.5 in. long, acuminate; peduncles many, 2.5—6 in. long, usually 5-ribbed; sheaths close, shorter than the leaves, acute or obtuse; involucral bracts obovate, rounded, pale brown; floral bracts obovate, caudately cuspidate, outer glabrous, innermost white- or yellowish-puberulous near the apex; receptacle conical, pilose; ♂ calyx-lobes subacute, glabrous, corolla-lobes glabrous or with a few white papillose hairs at the tip, with or without a small apical

black gland; ♀ sepals 3, free, linear-spathulate, glabrous, subequal or 1 shorter and narrower, petals 3, ligulate or ligulate-spathulate, longer than the sepals, usually with a small apical black gland, glabrous or sparsely pilose; seeds oblong-subglobose, yellowish-brown, reticulated with transverse ridges.....25. *conicum*.

♂ sepals free, 2, rarely 3:—

H heads 1—15 in. diam., many-flowered. Leaves linear, or ensiform, .5—3 in. long; peduncles many, 1—5 in. long, shallowly 5-ribbed; sheaths lax, widened upwards, as long as or a little shorter than the leaves, acute; involucre bracts obovate-oblong or nearly rotund, apex rounded or subtruncate, yellowish-brown, shining; floral bracts obovate-spathulate, concave, rounded or shortly cuspidate, dark, apex white-hairy; receptacle flat, shortly conical or hemispheric, pilose; ♂ sepals rarely 3, obovate-oblong, concave, obtuse, glabrous or more or less white hairy at the apex, corolla-lobes glabrous or nearly so, with or without an apical black or red gland; ♀ sepals 2, rarely 3, boat-shaped, sometimes with a thickened keel or a narrow dorsal wing, white pubescent near the apex, petals 3, very short, filiform, with an apical tuft of long hairs, eglandular; seeds oblong, reddish-brown, with longitudinal rows of white papillae.....26. *Thwaitesii*.

H heads .05 in. diam., few-flowered. Leaves linear, acute, up to .5 in. long; peduncles solitary or few, .5—1.6 in. high, 2—4-ribbed; sheaths lax upwards, about as long as the leaves, acute; involucre bracts obovate-oblong, obtuse or apiculate, dark green; floral bracts narrowly obovate, concave, obtuse or subacute, dark green, apex shortly puberulous; ♂ sepals narrowly obovate-oblong, apex shortly white-pubescent, apex of corolla-lobes shortly white-pubescent and with a black gland; ♀ sepals 2, boat-shaped, sometimes keeled, obtuse, apex shortly white-pubescent, petals 3, half as long as the sepals, capillary, with a tuft of long hairs at the apex, eglandular; seeds subglobose-ovate, reddish-brown, faintly transverse-reticulate, with or without longitudinal rows of white papillae.....27. *Gamblei*.

1. *ERIOCAULON SETACEUM*, Linn. : F. B. I. vi. 572; Fyson J. I. B. ii. 193, t. 1. *E. intermedium*, Koern. ; Fyson J. I. B. ii. 193. Mysore, 2,000—3,000 ft. (Meebold); West Coast.
2. *ERIOCAULON CUSPIDATUM*, Dalz. ; F. B. I. vi. 581; Fyson J. I. B. ii. 317, t. 38. Mysore at Tirthahalli (Fyson); Quilon (Venkoba Rao).
3. *ERIOCAULON STELLULATUM*, Koern. ; F. B. I. vi. 579; Fyson J. I. B. ii. 317, fig. p. 319. Mysore at Tirthahalli (Fyson) Wynaad, 3,000 ft. (Beddome).
4. *ERIOCAULON SEXANGULARE*, Linn. : F. B. I. vi. 580; Fyson J. I. B. ii. 318, tt. 39, 40; *E. Wallichianum*, Mart. ; Wall. Pl. As. Rar. t. 249. Along the W. Coast at low elevations.
5. *ERIOCAULON ENSIFORME*, Fischer in Kew Bull. 1930, 159. Tinnevely Hills.
6. *ERIOCAULON ROBUSTUM*, Steud. ; F. B. I. vi. 572; Fyson J. I. B. ii. 310, fig. p. 311. Nilgiri Hills, 5,000—7,000 ft.; Attapadi Hills (Fischer).

7. ERIOCAULON LONGICUSPIS, Hook. f. var. POLYCEPHALA, Fyson J. I. B. ii. 308, fig. p. 309. *E. polycephalum*, Hook. f. F. B. I. vi. 573.
Vizagapatam Hills at 5,000 ft. (A. W. Lushington); W. Gháts, 3,000—7,000 ft.
8. ERIOCAULON ODORATUM, Dalz.; F. B. I. vi. 574; Fyson J. I. B. ii. 308, t. 24.
Mysore State (Meebold); Anamalai Hills (Fischer); Pulney Hills; High Wavy Mountains (Blatter & Hallberg); Travancore, 3,000—7,000 ft.
Smelling of chamomile.
9. ERIOCAULON MELALEUCUM, Mart.; F. B. I. vi. 574; Fyson J. I. B. iii. 18. *E. Geoffreyi*, Fyson J. I. B. ii. 196, fig. p. 197. *E. horsleykondae*, Fyson var. *megalocephala*, Fyson J. I. B. iii. 14, t. 44.
W. Gháts from Mysore to the Pulney Hills; 5,000—7,000 ft.
10. ERIOCAULON BROWNIANUM, Mart. var. NILAGIRENSE, Fyson J. I. B. ii. 263, fig. p. 263. *E. Brownianum*, Mart. (in part); F. B. I. vi. 576.
W. Gháts, 5,000—7,000 ft.
11. ERIOCAULON ROBUSTO-BROWNIANUM, Ruhl.; Fyson J. I. B. ii. 264, t. 18. *E. Rhodae*, Fyson J. I. B. ii. 264, fig. p. 265.
Kurg.; S. Kanara; Malabar; Wynaad; sea-level to 3,500 ft.
12. ERIOCAULON LANCEOLATUM, Miq.; F. B. I. vi. 577; Fyson J. I. B. ii. 266, t. 23.
Near Mangalore (Hohenacker).
13. ERIOCAULON VANHEURCKII, Muell.-Arg. *E. Thomasi*, Fyson J. I. B. ii. 318; t. 41.
Near Mangalore (Hohenacker); Mundomuzhi in Travancore (Calder & Ramaswami).
14. ERIOCAULON SIEBOLDIANUM, Sieb. & Zucc.; F. B. I. vi. 577; Fyson J. I. B. iii. 15, tt. 50, 51.
At low elevations in all the coastal Districts.
15. ERIOCAULON RITCHIEANUM, Ruhl.; Fyson J. I. B. iii. 16. *E. horsleykondae*, Fyson J. I. B. iii. 13, t. 43.
Mysore (Talbot); Horsleykonda at 4,000 ft. (Gamble, Fischer); on the Nilgiri Kundahs at 7,000 ft. (Barnes).
16. ERIOCAULON MARGARETAE, Fyson J. I. B. ii. 316.
Rudrasiri in Mysore (Fyson).
17. ERIOCAULON ELENORAE, Fyson J. I. B. ii. 316, t. 35.
Gudalur, Nilgiri District (Beddome); Manantoddy, Wynaad.
18. ERIOCAULON TRUNCATUM, Ham.; F. B. I. vi. 578; Fyson J. I. B. ii. 199.
Rampa Hills (V. Narayanswami); Seshachalam Hills at 2,500 ft. (Gamble); Chingleput District; S. Kanara; Chedleth in N. Malabar at 2,600 ft. (Fischer); Quilon and Courtallam.
19. ERIOCAULON MINUTUM, Hook. f. F. B. I. vi. 579; Fyson J. I. B. ii. 317, t. 36.
Mysore (Adams); Nilgiri Kundahs at 7,000 ft. (Barnes).
20. ERIOCAULON PECTINATUM, Ruhl.; Fyson J. I. B. iii. 17.
Nilgiris (Perrottet).
21. ERIOCAULON XERANTHEMUM, Mart.; F. B. I. vi. 584; Fyson J. I. B. ii. 200, fig. p. 201.

- W. Coast; Mount Stuart, S. Coimbatore District at 2,400 ft. (Fischer).
22. *ERIOCAULON DIANAE*, Fyson J. I. B. ii. 259, tt. 11, 12.
Rudrasiri in Mysore (Fyson).
Var. *longibracteata*, Fyson J. I. B. ii. 259, t. 13.
With longer involucre bracts and the 3rd ♀ sepal broad.
S. Kanara (Fyson); Calicut.
- Var. *Richardiana*, Fyson J. I. B. ii. 260, t. 14.
Kurg; Mysore; S. Kanara; Kanoth in N. Malabar.
23. *ERIOCAULON QUINQUANGULARE*, Linn.; F. B. I. vi. 582; Fyson J. I. B. ii. 204, t. 9.
In all Districts; sea-level to 4,000 ft.
24. *ERIOCAULON COLLINUM*, Hook. f. F. B. I. vi. 584; Fyson J. I. B. ii. 206, fig. p. 207.
Mysore at 3,000 ft. (Meebold); W. Gháts up to 7,500 ft. Common.
25. *ERIOCAULON CONICUM*, Fischer n. comb. *E. Dianae*, Fyson var. *conica*, Fyson J. I. B. ii. 260.
Mahendragiri, Ganjam (Fischer); Agalhatti, Mysore at 3,500 ft. (Meebold); Gudalur, Nilgiri Districts (Beddome).
26. *ERIOCAULON THWAITESII*, Koern.; F. B. I. vi. 583; Fyson J. I. B. ii. 202, fig. p. 202.
N. Coimbatore at 4,400 ft. (Fischer); Nilgiri Hills; Shevaroyes (Bourne); Pulney Hills (Fyson).
27. *ERIOCAULON GAMBLEI*, Fischer in Kew Bull. 1930, 160.
Neduvattam, Nilgiris at 6,000 ft. (Gamble).

Family CLXXV. CYPERACEAE.

Grass-like annual or perennial herbs; roots fibrous; rhizomes 0, short or long, often scaly. *Stems* usually solid, terete or more often 3-angled. *Leaves* grass-like, sometimes 0, often 3-ranked, usually crowded near the base of the stem; sheaths closed, rarely split; ligule 0 or insignificant. *Bracts* usually like the leaves and commonly a little broader. *Flowers* 1 or 2-sexual, in the axils of glumes arranged distichously or spirally in spikelets which are solitary or variously disposed in heads or panicles; the bases of the branches of the inflorescence sometimes embraced by a sheath (*cladophyllum*). *Perianth* 0 or of 6 scales or bristles or an indefinite number of hairs. *Stamens* 1—3, rarely more; anthers linear or oblong, basifixed, apex sometimes crested. *Ovary* superior, sometimes enclosed in a utricle, 1-celled; ovule 1, basal, erect, anatropous; style short or long, 2—3-cleft, rarely entire or nearly so, branches slender, stigmatic. *Fruit* a compressed, rounded or 3-angled, sometimes bony, nut. *Seed* free, erect; embryo minute, enclosed in the usually floury albumen.

Nut not enclosed in a utricle:—

Nut-bearing glumes containing perfect stamens as well:—

Empty glumes at base of spikelets 0—2:—

Glumes distichous (see also 8. *Fimbristylis*); hypogynous bristles 0:—

Stigmas 2:—

Rhachilla deciduous as a whole.....1. *Kyllinga*.

- Rhachilla persistent:—
 Nut compressed radially to the rhachilla.....2. **Pycnus**.
 Nut compressed tangentially to the rhachilla.....3. **Juncellus**.
 Stigmas 3 or style subentire:—
 Rhachilla persistent.....4. **Cyperus**.
 Rhachilla deciduous above the 2 lowest glumes leaving a knob:—
 Keels of nut-bearing glumes not winged.....5. **Mariscus**.
 Keels of nut-bearing glumes winged.....6. **Courtoisia**.
 Glumes spirally arranged (basal ones sometimes distichous in 8. **Fimbristylis**);
 hypogynous bristles or scales sometimes present:—
 Style-base dilated and constricted or articulated above the nut:—
 Hypogynous bristles present; style usually persistent; leaves 0
 7. **Eleocharis**.
 Hypogynous bristles 0; leaves usually developed:—
 Style-base often persistent, if falling not leaving a tumour on the nut;
 leaves sometimes reduced to sheaths.....8. **Fimbristylis**.
 Style deciduous, leaving a tumour on the nut.....9. **Bulbostylis**.
 Style-base not dilated, continuous with the nut:—
 Hypogynous bristles not hyaline, sometimes 0; not enveloping the nut:—
 Hypogynous bristles all setaceous, rarely 0; glumes rarely awned and
 then from the apex.....10. **Scirpus**.
 Hypogynous bristles rarely 0, 3 of them broadly ovate, rarely all
 setaceous; glumes awned on the back from below the apex
 11. **Fuirena**.
 Hypogynous bristles 2, hyaline, elliptic, enveloping the nut
 12. **Lipocarpha**.
 Empty glumes at base of spikelets 3 or more:—
 Stigmas 2; style-base dilated, not continuous with the nut; nut beaked by
 the persistent style-base.....13. **Rynchospora**.
 Stigmas 3; style-base not dilated; nut not beaked.....14. **Remirea**.
 Nut-bearing glumes devoid of perfect stamens:—
 Spikelets 2-sexual; ♀ flower solitary, terminal; nuts not bony:—
 Stems trigonous; leaves broad; inflorescence paniculate.....15. **Hypolytrum**.
 Stems terete; leafless; inflorescence of a single lateral spikelet.....16. **Lepironia**.
 Spikelets 1-sexual or the ♀ flower basal; nuts bony:—
 Spikelets usually 2-sexual, ♀ flower basal.....17. **Scleria**.
 Spikelets unisexual, ♀ flower terminal.....18. **Diplacrum**.
 Nut enclosed in a utricle:—
 Spikelets 1-flowered; flower 2-sexual; rhachilla deciduous above the 2nd glume;
 2nd glume spatheform.....19. **Ascopholis**.
 Spikelets many-flowered; flowers unisexual; rhachilla persistent; glumes not
 spatheform.....20. **Carex**.

1. *Kyllinga*, Rottb.

Stem 3-angled, leafy only at the base, terminated by 1—3, rarely more, sessile, capitate, ovoid or cylindric spikes. *Spikelets* numerous, small, compressed; glumes 4—5, rarely more, distichous; rhachilla disarticulating and falling off whole above the 2 lowest, very small, empty glumes; 3rd glume 2-sexual, 4th ♂ or empty, rarely ♀, 5th (and rarely 1 or 2 more) rudimentary or altogether absent. *Stamens* 1—3. *Ovary* suborbicular; style not swollen at the base. *Nut* smooth, sometimes apiculate by the persistent base of the style.

Rhizome very short or 0; stems close:—

Keel of nut-bearing glume not crested:—

Rhizome practically 0; stems not robust:—

Stems more or less thickened at the base, solitary or tufted, 3—10 in. high; leaves from half to as long as the stem, rarely longer, .05—17 in. wide; bracts 3—4, up to 6 in. long; heads usually 3, rarely fewer or 4—5, cylindric-ovoid, pale, central one up to .4 in. long, others smaller; 2 upper glumes narrow, nutlet yellow-brown.....1. *triceps*.

- Stems not or hardly thickened at the base, solitary or tufted, 3—16 in. high; leaves from half to $\frac{3}{4}$ as long as the stem, .05—1 in. wide; bracts 3—4, up to 4.5 in. long; heads usually solitary, cylindric, up to .6 in. long, sometimes 2 smaller lateral present; upper glumes broad; nut yellow-brown, ultimately black.....2. *cylindrica*.
 Rhizome horizontal, thick; stems 2—many, rather robust, up to 36 in. high, acutely 3-angled at the summit; leaves much shorter, .1—2 in. wide; bracts 3—4, 1—7.5 in. long; head solitary, subglobose or ovoid, up to .4 in. long; upper glumes subequal, ovate, acute, keel smooth, tip excurrent; nut oblong-obovoid, ultimately black.....3. *melanosperma*.
 Keel of nut-bearing glume with a broad, hyaline, toothed crest. Root fibrous; stems slender, 2—12 in. long, tufted; leaves usually longer, up to .12 in. wide; bracts 3—4, divaricate, up to 6 in. long; head usually solitary, subglobose, .17 in. diam.; upper glumes ovate, subacute, keel excurrent and recurved...4. *squamulata*.
 Rhizome elongate, clothed with oblong brown scales; stems spaced, rarely close:—Rhizome up to 16 in. long; stems .75—36 in. high; leaves few, usually much shorter, up to .2 in. wide; bracts 3—4, up to 6 in. long; head usually solitary, subglobose or ovoid, up to .3 in. long; upper glumes ovate, keel scutellous; nut elongate, yellowish-brown.....5. *brevifolia*.
 Rhizome up to 6 in. long; stems slender, up to 25 in. long; leaves as long, longer or shorter, up to .2 in. wide; bracts 3—4, up to 7 in. long; head usually solitary, ovoid, up to .4 in. long, upper glumes ovate, keel of the nut-bearing one with a lunate, entire crest; nut suborbicular, yellowish-brown.....6. *monocephala*.

1. KYLLINGA TRICEPS, Rottb.; F. B. I. vi. 587.
In all the E. and Central Districts, up to 3,000 ft.; dry parts of Travancore. Vern. *Kan. Ananta Gonde Hullu*.
2. KYLLINGA CYLINDRICA, Nees; F. B. I. vi. 588.
Mysore; Nilgiri and Pulney Hills; up to 6,000 ft.
Very like the previous species but more slender.
3. KYLLINGA MELANOSPERMA, Nees; F. B. I. vi. 588.
W. Gháts; 4,000—7,000 ft.; Travancore at 300 ft. (Calder); Kollimalai Hills.
4. KYLLINGA SQUAMULATA, Vahl.; F. B. I. vi. 589.
S. Kanara (Metz).
5. KYLLINGA BREVIFOLIA, Rottb.; F. B. I. vi. 588.
Mahendragiri, Ganjam District (Fischer); Rampa (Narayan-swami); Vizagapatam District, Mysore and W. Gháts.
6. KYLLINGA MONOCEPHALA, Rottb.; F. B. I. vi. 588.
In all Districts; from sea-level to 7,000 ft.
Much resembling the last species.

2. *Pycneus*, Beauv.

Stems leafy at the base or sometimes above. Inflorescence of 1—many corymbose-subumbellate spikes, sometimes fascicled; umbel usually simple. Glumes distichous, 4—very many, 2 lowest empty, the next bi-sexual, the uppermost 1—3 sterile or empty. Rhachilla persistent. Stamens 1—3. Style 2-fid. Nut laterally compressed in the plane of the rhachilla.

Epidermal cells of the nut longitudinally oblong. Stems tufted, 4—12 in. high; leaves filiform, usually shorter; bracts 1—2, often 1 or 2 more above, subtending the next spikelets, up to 3 in. long; spikelets straw-coloured, compressed, linear-oblong, .25—.5 in. long, .1 in. wide, in fruit up to 1.5 in. long; glumes 7—40 pairs, narrowly ovate, acute, margins sometimes partly hyaline, minutely mucronate; nut compressed-orbicular, obtuse, black, often with whitish transverse lines

1. *stramineus*.

Epidermal cells of the nut subquadrate-hexagonal, sometimes appearing dotted:—

Stems clothed to considerably above the base (up to half its length) with the leaf-sheaths, 3—18 in. high. Rhizome creeping, 4—10 in. long; leaves from half to as long as the stem, up to 15 in. wide, rarely 0; bracts 3—5, 1—6 in. long; umbel simple, sometimes contracted into a head, rays stout or slender, up to 1.5 in. long; spikelets linear or oblong-lanceolate, compressed, 3—7 in. long, 1—15 in. wide, reddish; glumes 3—14 pairs, shallowly boat-shaped, obtuse, 3-nerved on the back, mid-nerve green, not excurrent, sides reddish-brown; nut suborbicular, compressed, brown.....2. *sanguinolentus*.

Stems with leaves only at the base:—

Rhachilla of spikelets distinctly winged. Stems 2—12 in. high, tufted; leaves as long or longer, flaccid; bracts 3—4, up to 6.5 in. long and .2 in. wide, often longer than the stem; umbel simple, rays 3—7, up to 3.5 in. long, sometimes reduced to a cluster of sessile spikelets; spikelets compressed, oblong, 6—10-flowered; glumes narrowly ovate-oblong, keel herbaceous, produced into a slightly recurved cusp, sides hyaline with 2—3 strong nerves; nut oblique, ovate-oblong, much compressed, apex truncate or slightly retuse, dark-brown.....3. *hyalinus*.

Rhachilla of spikelet not or very faintly winged:—

Glumes distinctly cuspidate, apex retuse. Stems tufted, few or crowded, slender, 1—6 in. high; leaves shorter or longer, filiform; bracts 3—4, up to 5 in. long; heads of spikelets sessile and congested or umbelled with 2—6 rays or broken up into pedunculate spikes sometimes up to 3 in. long; spikelets compressed, ovate-lanceolate to linear, .15—7 in. long, .05—1 in. wide; glumes 8—25 pairs, pale or marked with red, oblong or orbicular when opened out, keel strong, sides hyaline; nut obovoid or oblong, minutely apiculate, dark-brown.....4. *pumilus*.

Glumes not cuspidate nor retuse:—

Stems tufted:—

Nut symmetric or nearly so:—

Rhachilla straight, not at all winged; glumes obtuse; styles long-exserted. Annual; stems 2—25 in. high; leaves shorter, almost filiform; umbel simple, rays 3—5, subsessile to 2 in. long; bracts 2—4, up to 9 in. long; spikes of 5—50 more or less congested spikelets; spikelets compressed, linear, parallel-sided, apex hardly tapering, blunt or subacute, .15—7.5 in. long, .1—12 in. wide, pale-brown to dark-chestnut or almost black, 2—50-flowered; nut broadly ellipsoid or obovoid, apex rounded and distinctly apiculate, dark-brown.....5. *globosus*.

Rhachilla more or less zigzag with a very narrow hyaline wing, wider near the insertion of the acute glumes; styles not or slightly exserted. Perennial; stems 3—30 in. high, sometimes almost 0; leaves shorter, up to 16 in. wide; umbel simple, rays 2—7, up to 2 in. long, or sometimes congested into a single head; bracts 3—8, up to 8.5 in. long; spikelets congested or distant, narrowly linear, tapering to an acute apex, .3—7.5 in. long, .1 in. or less wide, pale- or reddish-brown, 10—50-flowered; nut narrowly oblong, apex subtruncate, minutely apiculate, brown.....6. *odoratus*.

Nut asymmetric, oblong, sometimes slightly curved, the side away from the rhachilla flattened, the other curved, both faces with a median longitudinal depression. Stems rarely solitary, 1—10 in. high; leaves shorter, very narrow; umbel usually simple, rays 3—6, up to 4 in. long; bracts 3—6, up to 6 in. long and .1 in. wide; spikelets aggregately spicate at the ends of the rays, linear, straw-coloured, .4—1 in. long, .05 in. wide, 16—50-flowered; rhachilla in fruit zigzag; glumes narrow, obtuse, sides nerveless; nut shortly apiculate, dark-brown.....7. *sulcinus*.

Stems solitary:—

Glumes acute, not white- or hyaline-margined. Stems 6—36 in. high; leaves $\frac{1}{2}$ — $\frac{3}{4}$ as long, .1 in. wide, rigid, sometimes twisted; umbel simple, rays 3—8, up to 4 in. long; bracts 2—5, up to 8 in. long;

spikelets ovate or ovate-lanceolate, yellowish- or reddish-brown, .4—7 in. long, .15—2 in. wide; glumes ovate, .15—1.75 in. long, usually mucronate; nut broadly obovate, slightly unsymmetric, black

8. *unioloides* var. *angulata*.

Glumes obtuse, margins white- or brownish-hyaline:—

Stems robust, 10—31 in. long; leaves as long, .2 in. wide, flaccid; umbel simple or compound, primary rays 4—10, up to 6 in. long; bracts 3—5, up to 25 in. long; bracteoles few, confined to the base of the umbel, subulate, filiform, rays closely embraced below by a truncate or shortly acutely 2-lobed sheath; spikelets racemed, linear to ovate-oblong, reddish-brown, .5—1.25 in. long, .1—12 in. wide; glumes on the same side slightly overlapping at maturity, .1 in. long, margin paler, usually undulate; nut broadly ellipsoid or obovate, truncate or retuse, black or dark-brown.....9. *puncticulatus*. Stems robust, up to 3 ft. high; leaves shorter, up to .5 in. wide, flaccid; umbel compound; primary rays 4—12, up to 9 in. long, loosely embraced below by a 2-lobed sheath, the lobes short or long and acuminate; bracts 4—6, up to 20 in. long and .6 in. wide; bracteoles numerous, throughout the umbel, filiform; spikelets racemed, linear or linear-lanceolate, pale-brown, .6—1.1 in. long, .1—12 in. wide; glumes distant, not overlapping at maturity, .1 in. long, margins white, conspicuous, flat; nut obovate, apex rounded, black.....10. *albomarginatus*.

1. *PYCREUS STRAMINEUS*, C. B. Clarke; F. B. I. vi. 589.
Kamban, Madura District (Blatter and Hallberg); S. Kanara; Cochin (Gamble); Travancore.
Roots aromatic (J. D. Hooker).
2. *PYCREUS SANGUIOLENTUS*, Nees; F. B. I. vi. 590.
Mahendragiri, Ganjam District (Fischer); Mysore (Meebold); Kurnool (Bourne); Coimbatore (Wight); Nilgiri and Pulney Hills, up to 6,000 ft.; Malabar (Barber); Peermade, Travancore (K. Venkoba Rao).
3. *PYCREUS HYALINUS*, Dom. *P. pumilus*, Nees; F. B. I. vi. 591.
About Madras City; Satiyamangalan, Coimbatore District (A. W. Lushington, Fischer); Pulney Hills at 6,000 ft. (Anglade).
4. *PYCREUS PUMILIS*, Dom. *P. nitens*, Nees; F. B. I. vi. 591. *Cyperus pygmaeus*, Retz., and *C. pusillus*, Vahl; F. B. I. vi. 619.
E. and W. Coasts at low levels; Nilgiri, Shevaroy and Bababudan Hills.
5. *PYCREUS GLOBOSUS*, Reichb. *P. capillaris*, Nees, var. *nilagiricus*, C. B. Clarke; F. B. I. vi. 592.
In all Districts; from near sea-level to 7,000 ft. Vern. *Kan.* Chendu Cheni Hullu.
6. *PYCREUS ODORATUS*, Urb. *P. polystachyus*, Beauv.; F. B. I. vi. 592. *P. ferrugineus*, C. B. Clarke; F. B. I. vi. 593.
In all Southern Districts; up to 2,000 ft. Vern. *Kan.* Mummule Jambu Hullu.
7. *PYCREUS SULCINUX*, C. B. Clarke; F. B. I. vi. 593.
Anamalais (Beddome); Travancore (M. Rama Rao).
8. *PYCREUS UNIOLOIDES*, Dom., var. *ANGULATUS*, Dom. *P. angulatus*, Nees; F. B. I. vi. 593.
Nilgiri and Pulney Hills; 6,000—7,000 ft.

9. PYCREUS PUNCTICULATUS, Nees; F. B. I. vi. 593.

Ganjam (Beddome); Carnatic and Mysore; in rice-fields and tank margins.

10. PYCREUS ALBOMARGINATUS, Nees; F. B. I. vi. 594.

Quilon (K. Venkoba Rao), in rice-fields.

3. Juncellus, C. B. Clarke.

Stems erect, leafy only near the base. *Leaves* rarely reduced to sheaths; sheaths not inflated. *Inflorescence* umbellate or capitate. *Spikelets* compressed; rachilla persistent. *Glumes* distichous, concave, the 2 lowest empty, the uppermost 1—3 sterile or empty, the intermediate bisexual. *Stamens* 3 or 2. *Style* 2-fid. *Nut* plano-convex, more or less compressed at right angles to the rachilla.

Inflorescence umbelled. *Rhizome* very short or 0; *stems* robust, 3 ft. or sometimes more high, often over 1 in. diam. at the foot; *leaves* several, as long as the stem or shorter, .3—5 in. wide, coriaceous; *umbel* large, compound, *primary rays* 4—10, up to 8 in. long, *secondary rays* 4—8, up to 6 in. long; *bracts* about 6, up to 35 in. long and .6 in. wide; *bracteoles* 3—6, linear, usually shorter than the spikes; *spikelets* straw-coloured, in sessile and peduncled crowded spikes up to 2 in. long, elliptic-lanceolate or ovate-oblong, .15—25 in. long; *glumes* ovate, mucronulate; *nut* obovoid, pale-brown.....1. *alopecuroides*.
Inflorescence capitate:—

Rhizome 0; *stems* densely tufted, .5—10 in. long; *leaves* numerous, as long or shorter, very narrow; *bracts* 2—6, dilated at the base, up to 6 in. long; *spikelets* sessile, densely packed in a terminal ovate or globose head .2—5 in. long, .1 in. wide; *glumes* greyish-brown; closely imbricate, oblong-lanceolate, cuspidate; *nut* ellipsoid, pale brown.....2. *pygmaeus*.

Rhizome creeping, slender, short or long, sometimes floating and up to 2 yards long, clothed with brown scales; *stems* congested or distant, bases enclosed in chestnut-red sheaths, 3—24 in. high; *leaves* usually short, sometimes as long as the stem, sometimes almost absent; *bracts* 2, 1 very short and broad, the other up to 2 in. long, appearing as if a continuation of the stem; *spikelets* sessile, few—30 in a densely congested head which appears to be lateral, linear-oblong, straw-coloured, .2—5 in. long; *glumes* broadly ovate, acute, mucronulate; *nut* obovoid, plano- or concavo-convex.....3. *laevigatus*.

1. JUNCCELLUS ALOPECUROIDES, C. B. Clarke; F. B. I. vi. 595.

Vizagapatam District at 2,000 ft. (Gamble); Carnatic and Mysore; in rice-fields.

Vern. Kan. Billi Jambu Hullu.

2. JUNCCELLUS PYGMAEUS, C. B. Clarke; F. B. I. vi. 596.

In all Districts; up to 1,500 ft.

3. JUNCCELLUS LAEVIGATUS, C. B. Clarke; F. B. I. vi. 596.

In all the Eastern Districts; in marshy places.

4. Cyperus, Linn.

Annual or perennial erect or floating herbs. *Leaves* usually radical, flat or terete and channelled, rarely entirely reduced to sheaths. *Inflorescence* capitate or of simple or compound umbels; *bracts* like the leaves, rarely reduced almost to scales, usually divaricate, sometimes one erect. *Spikelets* linear or oblong, usually compressed, seldom terete. *Rachilla* persistent, often winged, the wings often interrupted and in pairs opposite the nuts, sometimes united to the glumes. *Glumes* usually distichous, the 2 lowest empty, 4—many

succeeding ones bisexual, the uppermost 1—3 sterile or empty. *Stamens* 3 or 2, rarely 1; anthers sometimes crested. *Style* 3-fid, rarely undivided, not tumid at the base nor articulated to the nut. *Nut* usually 3-gonous, less often plano-convex.

Plants floating in water; base or angles of the nut corky:—

Style long, undivided or obscurely 3—2-toothed. *Stems* slender, up to 18 in. long; *leaves* from $\frac{2}{3}$ to as long; *bracts* 1—8 in. long; *spikelets* numerous, congested in a single head $\cdot 2$ — $\cdot 7$ in. diam., angular, $\cdot 2$ — $\cdot 5$ in. long, rigid, often curved; *rhachilla* stout, very narrowly winged; *glumes* broadly ovate, boat-shaped, rigid, acute or acuminate; *nut* half as long as the glume, ovoid, unequally 3-sided, base corky.....1. *cephalotes*.

Style short, *branches* 3, as long, linear. *Stem* robust, sharply 3-angular, up to 4 ft. high; *leaves* as long or longer, up to $\cdot 5$ in. wide; *bracts* several, up to 20 in. long, margins usually scabrous; *umbel* compound, usually large with corymbose radii up to 2 in. long; *spikelets* narrowly ovate to oblong, $\cdot 3$ — $\cdot 6$ in. long, light- or reddish-brown, umbellately or digitately clustered; *glumes* regularly imbricate, ovate, boat-shaped, mucronate; *nut* $\frac{2}{3}$ the length of the glume, ellipsoid, unequally 3-sided, angles corky.....2. *platystyliis*.

Plants rooted in marshes, dry soil or sand; nut not corky:—

Spikelets digitate or clustered, not spicate nor racemose:—

Glumes aristate or distinctly mucronate:—

Leaves and *bracts* filiform, less than $\cdot 05$ in. wide:—

Spikelets less than $\cdot 1$ in. wide:—

Glumes chestnut-brown, ovate, plicate, with awnlets $\frac{1}{2}$ as long, margins not hyaline. *Stems* tufted, 1—5 in. high; *leaves* as long or shorter; *bracts* shorter or longer than the inflorescence, up to $\cdot 4$ — $\cdot 5$ in. long; *spikelets* $\cdot 2$ — $\cdot 1$ in. long, clustered in single heads or compound-umbellate with rays up to 2 in. long; *nut* trigonous, linear-oblong, sides parallel, dark-red.....3. *castaneus*.

Glumes pale- or ferruginous-brown, ovate, plicate, with awnlets as long, margins often hyaline. *Stems* tufted, 2—6 in. high; *spikelets* $\cdot 15$ — $\cdot 5$ in. long; *nut* trigonous, oblong-obovoid, chestnut. *Other characters as in the last species*.....4. *uncinatus*.

Spikelets much compressed, $\cdot 3$ — $\cdot 7$ in. long, $\cdot 12$ — $\cdot 18$ in. wide, reddish-brown. *Stems* tufted, 2—8 in. high; *leaves* usually shorter; *bracts* 2, rarely 3, usually short, sometimes up to 2 in. long; *inflorescence* of a single head of 3—20 digitate spikelets; *glumes* broadly ovate, boat-shaped, keeled, conspicuously mucronate, margins usually hyaline, bases imbricating; *nut* trigonous, obovoid, dark-brown.....5. *Teneriffae*.

Leaves and *bracts* $\cdot 25$ in. or more wide:—

Glumes lax and rather distant, at least in fruit. *Rhizome* short; *stems* up to 24 in. high; *leaves* as long, $\cdot 3$ — $\cdot 6$ in. wide; *bracts* 4—10, nearly as long as the leaves; *umbel* decomposed, 3—12 in. diam.; *rays* many, up to 4 in. long; *spikelets* 3—9 together, digitate, linear-oblong, $\cdot 15$ — $\cdot 4$ in. long, compressed; *rhachilla* narrowly winged; *glumes* complicate, sub-orbicular when opened out, shortly cuspidate, margins broadly hyaline, pale-yellow to nearly chestnut; *nut* trigonous, broadly ellipsoid, dark-brown.....6. *diffusus*.

Glumes closely imbricate even in fruit. *Spikelets* $\cdot 2$ — $\cdot 7$ in. long, hardly compressed; *glumes* ovate, cuspidate. *Other characters as in the last species*, but plant generally larger; *stem* up to 30 in. high; *leaves* and *bracts* longer; *umbel* larger and more compound; *rays* up to 8 in. long

7. *pubisquama*.

Glumes at most minutely mucronate:—

Glumes $\cdot 025$ in. or less long, obovate, apex rounded. *Stems* tufted, weak, 3—20 in. long; *leaves* flaccid, usually shorter, $\cdot 1$ — $\cdot 17$ in. wide; *bracts* 2—4, 1—10 in. long; *umbel* simple or compound or less often reduced to a head, *rays* 3—10, slender, up to $\cdot 15$ in. long; *spikelets* many, densely aggregated into congested globose heads, $\cdot 1$ — $\cdot 2$ in. long; *rhachilla* not winged; *nut* subequally trigonous, broadly ellipsoid, nearly as long as the glume, yellow or pale-brown.....8. *difformis*.

Glumes .04 in. or more long, oblong or ovate, obtuse or acute:—

Inflorescence umbellate, not a single head:—

Rhizome slender, creeping; stems arising along it singly or in tufts, weak, up to 30 in. high; leaves usually shorter but sometimes longer, 1—3, narrow; bracts 2—3, usually shorter than the umbel, but occasionally much longer; umbel simple or compound; rays usually 4—10, sometimes up to 20, slender, up to 4 in. long; spikelets in clusters of 3—8, spreading stellately, linear, acute, compressed, .1—·5 in. long, .04 in. wide; glumes plicate, ovate-oblong when unfolded, obtuse, sometimes very shortly mucronate, pale- or chestnut-brown, .05—·075 in. long; nut trigonous, globosely obovoid, pale-brown, smooth.....9. *Haspan.*
Rhizome 0; stems solitary or tufted, weak, 2—12 in. high; spikelets .1—·3 in. long; glumes .04 in. long, apex broadly obtuse, not mucronulate, margins hyaline; nut nearly globose or very obscurely 3-sided, white, minutely verrucose when ripe. *Other characters as in the last species*.....10. *tenuispica*.

Inflorescence a single head:—

Rhizome short; rootlets wiry; spikelets distinctly compressed:—

Stem considerably thickened below, rigid, 5—18 in. high; leaves from $\frac{1}{2}$ to nearly as long, narrow; bracts 2, rarely 3, one longer than the other, .5—9 in. long; spikelets 3—20, spreading, lanceolate to elliptic-oblong, acute, pale, sometimes almost white, .4—1 in. long, .15—·2 in. wide; glumes ovate-lanceolate, acute, closely imbricate, up to .2 in. long; nut trigonous, obovoid, dark-brown or black.....11. *niveus*.
Stem only slightly thickened below, very slender, 3—10 in. high; leaves shorter or longer, very narrow; bracts 3—5, usually 3, .5—4 in. long; head dense, globose, whitish or pale cinnamon-coloured, .2—6 in. diam.; spikelets elliptic, .15—·2 in. long, .1 in. wide, obtuse; glumes oblong-lanceolate, obtuse, hardly imbricate, .05—·1 in. long; nut trigonous, oblong-ellipsoid, black.....12. *leucocephalus*.

Rhizome creeping; rootlets thick; spikelets not or hardly compressed:—
Rootlets glabrous or nearly so; rhizomes dichotomously branched, sheathed at the nodes with chestnut-coloured scales, rarely tuberosus; stems rigid, terete, 2—20 in. high; leaves usually shorter, terete, grooved on the upper side, rigidly coriaceous, often recurved, bracts 2—3, the lower up to 4 in. long, erect and appearing to be a prolongation of the stem; head globose, of many radiating sessile spikelets; spikelets ovoid or elliptic-oblong, acute, .25—·3 in. long, straw-coloured or pale-brown; glumes ovate, convex, hardly keeled, rounded and sometimes minutely apiculate, conspicuously 13-nerved, margins hyaline; nut trigonous, obovoid, concavo-convex, black...13. *arenarius*.
Rootlets densely woolly; stems robust, trigonous at the apex, up to 24 in. high, base thickened and clothed with broad dark-chestnut scales; leaves about as long, narrow, concave, coriaceous; bracts 3—4, elongate; head of 30—80 congested spikelets; spikelets lanceolate, acute, slightly compressed, .5 in. long, pale-brown; glumes imbricate, ovate, acute or very shortly cuspidate; nut obovoid, obscurely trigonous, dark-brown.....14. *pachyrhizus*.

Spikelets distinctly spicate or racemose:—

Rhachilla of spikelets not or hardly winged:—

Glumes cuspidate or aristate:—

Spikelets linear-oblong, acute, strongly compressed, .3—·7 in. long (up to 1.25 in. in fruit), .1—·2 in. wide, yellowish when ripe, 20—60-flowered. Stems tufted, up to 30 in. long, sometimes much reduced and almost absent; leaves usually shorter, very narrow; bracts 3—5, up to 8 in. long; umbel simple, often with a sessile head at the fork, sometimes reduced to a single head; rays up to 6, up to 5 in. long; spikelets 4—9, subdigitate or spicate at the ends of the rays, more numerous when in a single head; glumes plicate, ovate when unfolded, imbricate, keel produced into a strong mucro, .15—·2 in. long; nut trigonous, broadly obovoid, black or dark-brown.....15. *compressus*.
Spikelets oblong or linear-oblong, flat, .1—·3 in. long, 6—30-flowered, yellowish- or reddish-brown. Stems tufted, 1—9 in. high; leaves usually

shorter, narrow; bracts 2—5, .5—4 in. long; heads single or in umbels of 2—5 rays up to 1 in. long; spikelets crowded into globose or oblong heads which appear echinate by the spreading awns; glumes oblong, .04—05 in. long, tapering into a fine recurved awn as long, sides strongly nerved to the margin; nut trigonous, elliptic-obovoid, dark-brown

16. *aristatus*.

Glumes obtuse or minutely mucronate, not cuspidate nor aristate:—

Glumes plicate, orbicular-obovate when opened out, gibbous towards the rhachilla when folded, scarcely imbricate, keeled, sides nerveless, .05 in. long. Stems solitary or tufted, 3—31 in. high, trigonous; leaves usually shorter; bracts 3—5, 1—14 in. long; umbel decomposed, rays many, 1—8 in. long, bearing irregularly fascicled umbellules formed of narrow interrupted spikes of 5—20 spikelets; spikelets linear-oblong, .2—6 in. long, yellow or pale-brown; nut trigonous, obovoid, black.....17. *Iria*.

Glumes oblong or elliptic-oblong, not gibbous:—

Spikelets crowded in cylindric spikes. Stems stout, trigonous, 10—48 in. high; leaves usually a little shorter, sometimes longer, up to .35 in. wide; bracts 3—7, up to 28 in. long and .5 in. wide; umbel compound, large, erect, primary rays 4—13, up to 16 in. long, secondary umbels with 2—6 rays up to 6 in. long; spikelets densely imbricate in spikes 1—2 in. long, linear-oblong, flat, erect, .3—7 in. long, pale, reddish- or chestnut-brown; glumes oblong, apiculate or cuspidate, .05 in. long, margins hyaline, keel 5-nerved, hardly imbricate; nut trigonous, obovoid-oblong, dark-brown.....18. *eleusinoides*.

Spikelets not crowded in cylindric spikes:—

Margins of glumes not or very inconspicuously hyaline:—

Glumes .05 in. long, conduplicate:—

Spikelets spreading even in fruit. Rhizome stoloniferous; stems solitary or 2—3, slightly apart, 4—36 in. high; leaves longer or shorter, narrow; bracts 3—6, up to 16 in. long; umbel compound, usually large; primary rays 6—10, up to 10 in. long; secondary rays fewer, shorter, spreading, bearing horizontally spreading sessile spikelets on a slender rhachis; spikelets narrowly linear, .3—1 in. long; rhachilla very slender, wavy; glumes red-brown, elliptic-oblong, obtuse, distant, very slightly imbricate, diverging in fruit; nut trigonous, narrowly oblong, as long as or slightly exceeding the glume, dusky-brown.....19. *distans*.

Spikelets nearly erect, not spreading, in fruit contracted into tassels. Bracts usually, at least 1—2 of them, longer than the inflorescence, up to 43 in. long and .6 in. wide; spikelets .3—5 in. long; glumes pale-, red- or chestnut-brown, more or less imbricate and closely appressed to the straight or slightly wavy rhachilla even in fruit, not diverging; nut trigonous, narrowly oblong, shorter than the glume, brown. *Other characters as in the last species*.....20. *nutans*.

Glumes coriaceous, .07—09 in. long, shallowly concave, oblong, apex rounded, not keeled, brown or pale-brown, imbricate. Rhizome creeping, thick, stoloniferous; stems robust, up to 3 ft. high, sharply trigonous; leaves 0 or few, 2—6 in. long; bracts 3—5, up to 6 in. long and .35 in. wide; umbel simple, compound or congested; rays 3—12, 1—3 in. long, the longer ones corymbosely branched; spikelets 4—10 in a spike, linear, nearly terete, .3—6 in. long; nut narrowly oblong, obovately trigonous, ultimately black.....21. *malaccensis*.

Margins of glumes distinctly hyaline:—

Rhachis of spike hispidulous on the angles. Rootstock small, stoloniferous; stems up to 3 ft. high; leaves nearly as long or much shorter, up to .4 in. wide; bracts 3—5, up to 21 in. long and .5 in. wide; umbel compound; primary rays 2—10, up to 9 in. long, bearing pedicelled spikes of horizontal spikelets; spikelets linear or linear-lanceolate, .15—5 in. long; glumes .05—08 in. long, broadly ovate, sometimes minutely apiculate, pale- or reddish-brown; nut trigonous, subglobose obovate, black.....22. *pilosus*.

Rhachis of spike glabrous. Rootstock short, stout, stoloniferous and bulbiferous; stems up to 42 in. high; leaves often longer, thick, coriaceous or spongy, .1—5 in. wide; bracts 2—5, up to 8 in. long; umbel compound; primary rays 3—7, rather stout, 1—8 in. long; secondary rays bearing loosely corymbose spikes of 5—10 spikelets; spikelets remote, linear-oblong, .3—1.2 in. long, straw-coloured or reddish, shining; glumes boat-shaped, suborbicular when expanded, .08—1 in. long; nut trigonous, broadly obovoid, black

23. *procerus*.

Rhachilla of spikelets distinctly 2-winged opposite the seeds:—

Leaves short, rarely half as long as the stem, or 0:—

Stems terete, stout, thickened below, transverse septa distinct when dry, up to 6 ft. high. Rootstock stout, woody, stoloniferous; leaves reduced to sheaths or sometimes with a short foliaceous limb; bracts 1—3, scale-like, triangular, acute, under 1 in. long; umbel compound; primary rays up to 10, 1—6 in. long, slender, often curved; secondary rays terminating in corymbs of 8—15 spikelets; spikelets narrowly linear; .4—1.5 in. long; glumes oblong, obtuse or subacute, concave, .1 in. long; nut trigonous, narrowly oblong, black.....24. *articulatus*.

Stems trigonous above, spongy below, septae not or hardly visible when dry, up to 6 ft. high. Rhizome creeping, stout, woody; leaves reduced to sheaths or sometimes with a blade up to 6 in. long; bracts developed:—

Stems bluntly trigonous above; bracts 3—5, linear-ensiform, shorter than the inflorescence, up to 3 in. long and .2 in. wide; umbel compound; primary rays 6—15, slender, up to 6 in. long; secondary rays terminated by spikes or corymbs of 4—16 spikelets; spikelets linear, .4—1.5 in. long; glumes ovate-oblong when unfolded, obtuse or subacute, .1 in. long, straw-coloured or pale reddish-brown; wing of rhachilla narrow, usually pale; nut narrowly elliptic-oblong, trigonous, .06 in. long, black.....25. *corymbosus*.

Stems sharply trigonous above; lower bracts longer than the inflorescence, up to 25 in. long and .5 in. wide; glumes usually red-brown; wing of rhachilla rather wide, usually blood-red in fruit. Other characters as in the last species.....26. *Pangorei*.

Leaves long, very rarely less than half as long as, often longer than, the stem:—

Rhizomes stoloniferous:—

Stolons slender, ending in black-coated bulbils; stems subsolitary, slender, 2—12 in. long; leaves many, coming off a little distance above the base, slender, usually as long as or a little longer than the stem; bracts 2 or 3, arising one above the other, filiform, up to 4 in. long; inflorescence of a head of umbels 1—2 in. in diam., formed of slender alternate spikes bearing 3—12 spikelets; spikelets linear, .3—7 in. long; glumes ovate-oblong when unfolded, boat-shaped, obtuse, sometimes minutely mucronate, .05 in. long, 7—13-nerved, reddish-brown, laxly imbricate; nut trigonous with concave sides, obovoid, obtuse, black...27. *bulbosus*. Stolons not bulbiferous:—

Leaves flaccid, flat; umbels expanded, usually compound:—

Tubers not zoned; stems subsolitary, trigonous, 4—48 in. high; leaves shorter or longer, narrow, often numerous; bracts usually 3, shorter or more often longer than the inflorescence, up to 2 ft. long; umbel simple or compound; rays few to many, up to 6 in. long; secondary, if present, few, ending in 4—8 approximate, spreading spikelets; spikelets linear to lanceolate, .3—1.4 in. long; glumes imbricate, .1 in. long, plicate, ovate when expanded, obtuse or acute, keel 5—7-nerved, pale-straw or brown, or chestnut, sometimes with a reddish tinge; nut trigonous, broadly obovoid, greyish-black

28. *rotundus*.

Tubers zoned; stems usually solitary, trigonous, 6—12 in. high; leaves as long or nearly so; bracts 3—5, often shorter than the inflorescence; umbel usually compound; primary rays 6—8, slender, up to 4 in. long; secondary 3, up to 1.5 in. long; spikelets distantly alternate at the ends of the rays, yellow or yellow-brown, .4—8 in.

long; glumes rather laxly imbricate, .1 in. long, plicate, ovate when expanded, obtuse, distinctly striately nerved and keeled, keel greenish. *Other characters as in the last species.....29. esculentus.* Leaves rigid, filiform or very narrow; umbel simple, compact. Stolons elongate, branching, clothed with broad, acute scales; stems enlarged and tuberous below, 4—12 in. long, wiry, often flexuous; leaves shorter or as long, usually subulate and squarrosely recurved; bracts 3, up to 3 in. long; umbel of 4—6 rays, sessile or with peduncles up to 1.2 in. long, bearing 3—8 spreading spikelets; spikelets ovate- or linear-oblong, hardly compressed, .25—.6 in. long; glumes densely imbricate, broadly ovate when expanded, plicate, acute, .1 in. long, red, keel greenish, margins broadly hyaline, the lowest sometimes scarious; nut obovoid, plano-convex, dorsal surface hardly keeled, dark-brown.....30. *stoloniferus.*

Rhizome not stoloniferous:—

Spikelets linear, .4—1.2 in. long. Stems solitary, trigonous, 9—36 in. high; leaves from $\frac{2}{3}$ as long up to a little longer, narrow; bracts 3—5, usually short but sometimes up to 20 in. long; umbel usually with several rays up to 10 in. long, each with 3—16 alternating spikelets aggregated at the end; glumes broadly ovate when expanded, very concave, obtuse, .15 in. long, yellowish-brown, keel broad, margins scarious; nut subglobose in outline, sharply trigonous, dark red-brown

31. *Zollingeri.*

Spikelets .3 in. or less long, numerous in large compound umbels:—

Anthers not or very shortly crested:—

Spikelets distinctly compressed:—

Spikes digitate, all sessile, dense, cylindric, up to 1.5 in. long. Rhizome 0; stems solitary, stout, up to 3 ft. long, sharply trigonous; leaves rather shorter, up to .3 in. wide; bracts 5—7, some shorter, rest much longer than the inflorescence, up to 23 in. long; umbel rarely simple, dense; spikelets ovate- or oblong-lanceolate, .12—.2 in. long, .05 in. wide, suberect; glumes densely imbricate, plicate, broadly ovate when expanded, .05 in. long, obtuse, keel produced into a cusp, brown; nut small, ovoid or broadly ellipsoid, trigonous or with the dorsal angle very obtuse, black.....32. *imbricatus.*

Spikes umbelled or corymbose, some at least peduncled, cylindric, dense or lax, 1—2.5 in. long. Rhizome short; stems usually solitary, robust, spongy below, trigonous, up to 6 ft. high; leaves shorter or longer, up to .4 in. wide; bracts 3—6, up to 3 ft. long and .5 in. wide; primary rays 5—12, up to 9 in. long; spikelets numerous, close or somewhat distant, erect or spreading horizontally, elliptic- or oblong-lanceolate, subacute, markedly compressed, .15—.3 in. long, .05—.075 in. wide; glumes closely or laxly imbricate, broadly ovate when expanded, .05 in. long, keel produced into a distinct cusp, bright brown, red-brown or chestnut, keel often green or pale; nut very small, trigonous, broadly ellipsoid, narrowed at both ends, yellowish, dark-brown or black.....33. *exaltatus.*

Spikelets terete or nearly so, spirally inserted round an angular rachis, spreading horizontally, .15—.3 in. long, .05 in. or less wide. Rhizome stout, woody, creeping, sometimes 0; stems robust, woody, sharply trigonous upwards, up to 5 ft. high; leaves longer or shorter, up to .6 in. wide; bracts 3—12, up to 30 in. long and .6 in. wide; primary rays 4—10, up to 1 ft. long; spikes sessile or some peduncled, dense, cylindric, 1—2.2 in. long; glumes minute, broadly oblong when expanded, obtuse with a short cusp, chestnut or yellowish-brown; nut trigonous, ellipsoid or obovoid, straight or curved, dark-yellowish-brown or dark-grey.....34. *digitatus.*

Anthers with a crest $\frac{1}{2}$ — $\frac{1}{4}$ as long as the cells:—

Stem above bluntly trigonous, the angles smooth, stout, up to 4 ft. high; leaves nearly as long, up to .6 in. wide; bracts 8—12, up to 30 in. long; primary rays 7—12, up to 8 in. long; secondary

fewer, up to 2 in. long; spikes narrowly cylindric, clustered at the ends of the rays and a few sessile at the base of the partial umbels, 1—2.5 in. long; spikelets more or less densely spirally inserted on the angular rhachis, erect, linear, hardly compressed, .15—.25 in. long, acute, glumes closely imbricate, ovate when expanded, keeled, acute or very shortly mucronate, .05 in. long or less, pale- or yellowish-brown; nut very small, trigonous, ellipsoid, subacute at both ends, pale-brown or grey.....35. *elatus*. Stem upwards sharply trigonous, angles scabrous, cutting, stout, sometimes reaching 20 ft. high, usually much shorter; leaves as long or somewhat shorter, up to 1 in. wide, margins and keel serrulate; bracts 4—6, up to 31 in. long and 1 in. wide; primary rays 8—12, erect, up to 9 in. long; spikes linear, 5—10 corymbose at the ends of the secondary rays; spikelets densely spiral on the angular rhachis, subulate or nearly so, acute, .2—3 in. long; glumes closely imbricate and appressed, broadly ovate or suborbicular when expanded, concave, slightly keeled and minutely mucronulate, .1 in. long, pale-brown; nut very small, trigonous, narrowly oblong, apex acute, pale-lead-coloured.....36. *platyphyllus*.

1. CYPERUS CEPHALOTES, Vahl; F. B. I. vi. 597.
Madras (Wight); Cochin (Meebold); Travancore (Calder and Ramaswami).
2. CYPERUS PLATYSTYLIS, R. Br.; F. B. I. vi. 598.
Locality uncertain (Wight, Heyne).
3. CYPERUS CASTANEUS, Willd.; F. B. I. vi. 598.
In all Districts; at low elevations in swamps and rice-fields.
4. CYPERUS UNCINATUS, Poir. *C. cuspidatus*, H. B. K.; F. B. I. vi. 598.
S. Kanara (Hohenacker); Pulney Hills at 3,000 ft. (Saulière); Travancore (Ramaswami). In moist sandy places.
5. CYPERUS TENERIFFAE, Poir.; F. B. I. vi. 601.
Nallamalai Hills (Beddome); Dekkan; Coromandel; Nilgiri Hills (Hohenacker); Anamalai Hills (Fischer); Travancore. From sea-level to 7,000 ft.
In dry and often rocky situations.
6. CYPERUS DIFFUSUS, Vahl; F. B. I. vi. 603.
Rampa Hills at 3,000 ft. (Ramaswami); Palkonda Hills (Jacob); Anamalai Hills (Beddome); Travancore.
7. CYPERUS PUBISQUAMA, Steud.; F. B. I. vi. 604.
Mysore (Meebold) and the W. Coast.
In wet localities and in marshes in evergreen forest.
8. CYPERUS DIFFORMIS, Linn.; F. B. I. vi. 599.
In all districts, in marshy localities; sea-level to 8,000 ft. Vern. Kan. Kari Sanna Jambu Hullu.
9. CYPERUS HASPAN, Linn.; F. B. I. vi. 600.
In all Districts, in marshy localities and in rice-fields; sea-level to 5,000 ft.
10. CYPERUS TENUISPICA, Steud. *C. flavidus* Clarke non Retz.; F. B. I. vi. 600.
Common in all Districts in rice-fields; sea-level to 3,000 ft. Vern. Kan. Honnai Hu Hullu.
11. CYPERUS NIVEUS, Retz.; F. B. I. vi. 601.
N. Circars up to 1,500 ft.; Rampa (Narayanswami).
In dry grass-lands.

12. *CYPERUS LEUCOCEPHALUS*, Retz.; F. B. I. vi. 602.
Dekkan; Madanapalli (Fischer), Cuddapah Dist. (Meebold).
13. *CYPERUS ARENARIUS*, Retz.; F. B. I. vi. 602.
Along the sea-coast and river banks and in other sandy localities at low elevations.
14. *CYPERUS PACHYRRHIZUS*, Nees; F. B. I. vi. 602.
Coastal sands (Wight); Krusadai Island (Parthasarathy).
15. *CYPERUS COMPRESSUS*, Linn.; F. B. I. vi. 605.
In all Districts in moist situations; sea-level to 6,000 ft. The whole plant usually with a grey- or silvery-green sheen. Vern. *Tam.* Kunnagorai; *Kan.* Vusumani Hullu.
16. *CYPERUS ARISTATUS*, Rottb.; F. B. I. vi. 606.
In all Districts in moist sandy or pasture soils; sea-level to 8,000 ft.
17. *CYPERUS IRIA*, Linn.; F. B. I. vi. 606.
In all Districts in rice-fields and wet situations; sea-level to 4,000 ft. Vern. *Kan.* Dabbai Jambu Hullu.
18. *CYPERUS ELEUSINOIDES*, Kunth; F. B. I. vi. 608.
In all the E. and Central Districts; Nilgiri, Pulney and Travancore Hills; sea-level to 6,000 ft.
19. *CYPERUS DISTANS*, Linn. f.; F. B. I. vi. 607.
Dekkan; Carnatic; Nilgiri and Pulney Hills; Travancore; sea-level to 8,000 ft.
20. *CYPERUS NUTANS*, Vahl; F. B. I. vi. 607.
In most Districts inland; 1,000—6,500 ft.
21. *CYPERUS MALACCENSIS*, Lam.; F. B. I. vi. 608.
Quilon (Lawson).
22. *CYPERUS PILOSUS*, Vahl; F. B. I. vi. 609.
Mysore, Nilgiri and Pulney Hills; W. Coast at low elevations.
23. *CYPERUS PROCERUS*, Rottb.; F. B. I. vi. 610.
E. Districts from Nellore southwards, mostly near the sea in rice-fields; Bangalore (Cameron).
24. *CYPERUS ARTICULATUS*, Linn.; F. B. I. vi. 611.
In all the E. Districts; Ganjam (Alcock); Bellary; Cuddapah (Gamble); Mysore (Meebold); usually in standing water; sea-level to 3,000 ft. Vern. *Kan.* Yalai Jambu Hullu.
25. *CYPERUS CORYMBOSUS*, Rottb.; F. B. I. vi. 612. *C. tegetiformis*, Roxb.; F. B. I. vi. 612.
In all E. Districts and Travancore; sea-level to 3,000 ft. Vern. *Tam.* Pangorai. The stems of this and the next species are used for the fine Tinnevely mats.
26. *CYPERUS PANGOREI*, Rottb. *C. tegetum*, Roxb.; F. B. I. vi. 613.
In all Districts; from sea-level to 5,000 ft. Vern. *Tam.* Pangorai.
27. *CYPERUS BULBOSUS*, Vahl; F. B. I. vi. 611.
Dekkan and Carnatic; Beypore in S. Malabar; sea-level to 1,500 ft. Usually in sandy soil.
28. *CYPERUS ROTUNDUS*, Linn.; F. B. I. vi. 614. *C. Fenzelianus*, Steud.; F. B. I. vi. 615. *C. subcapitatus*, C. B. Clarke; F. B. I. vi. 616. *C. tuberosus*, Rottb.; F. B. I. vi. 616.

- In all Districts; sea-level to 6,000 ft. Vern. *Kan*, Bhadra Hullu. A troublesome weed, difficult to eradicate.
29. *CYPERUS ESCULENTUS*, Linn.; F. B. I. vi. 616.
At low levels and also in the Hills; Horsleykonda at 4,000 ft. (Gamble); Nilgiris (Hohenacker); Anamalais (Beddome). Not common. The tubers are sometimes used as food.
30. *CYPERUS STOLONIFERUS*, Retz.; F. B. I. vi. 615.
In coastal Districts, especially in sea-shore sand.
31. *CYPERUS ZOLLINGERI*, Steud.; F. B. I. vi. 612.
Pulney Hills at 7,000 ft. (Bourne); Peermade (Venkoba Rao).
32. *CYPERUS IMBRICATUS*, Retz. *C. radiatus*, Vahl; F. B. I. vi. 617.
Tranquebar (? Retz); Pykara at 6,000 ft. (Gamble); Kodaikanal (Bourne).
33. *CYPERUS EXALTATUS*, Retz.; F. B. I. vi. 617.
In all Districts from Cuddapah (Gamble) and Mysore southwards. In wet situations; sea-level to 3,000 ft. Vern. *Tam*. Paddupai Korai; *Kan*. Kempu Jambu Hullu.
34. *CYPERUS DIGITATUS*, Roxb.; F. B. I. vi. 618.
Bababudan, Nilgiri and Pulney Hills; 2,000—6,000 ft.
35. *CYPERUS ELATUS*, Linn. f.; F. B. I. vi. 618.
Dekkan (Wight).
36. *CYPERUS PLATYPHYLLUS*, Roem. v. Sch.; F. B. I. vi. 618.
E. Coast near the sea. Sriharikota (Gamble); Madras (Wight).

5. *Mariscus*, Vahl.

Erect herbs, usually perennial and glabrous; generally resembling the genus *Cyperus*. *Inflorescence* of a single head or in simple or compound umbels. *Spikelets* usually in compact compressed or terete heads. *Glumes* distichous, persistent on the rhachilla which disarticulates above the two lowest (which are empty and smaller than the rest), leaving a small knob or disk with, sometimes, an annular ridge on its summit. *Stamens* usually 3. *Style* 3-fid, continuous with the ovary; stigmas slender. *Nut* trigonous.

Base of stem thickened by turgid, chestnut-brown sheaths:—

Head solitary (rarely 2—4 together), ovoid, dense, 3—6 in. diam. Stolons 0; stems tufted, 3—20 in. high; leaves shorter or longer, flaccid; bracts 3—5, sometimes up to 9, 2—15 in. long, spikelets ovoid, bearing 2—6 nuts; glumes pale-brown; nuts oblong or subovoid, black.....1. *dubius*.
Spikes cylindric, subcapitate or in a simple umbel. Stolons slender, elongate, clothed in oblong-lanceolate, striate, pale-brown scales; stem solitary, 3—12 in. high; leaves usually shorter; spikes dense, 3—9 together, sessile or shortly peduncled, divaricate, up to 75 in. long; bracts 4—8, 2—7 in. long; spikelets narrowly ellipsoid, spreading at right angles, bearing 1 nut; glumes straw-coloured; nut ellipsoid, dark-brown.....2. *bulbosus*.

Base of stem not thickened by sheaths:—

Spikelets not markedly compressed; glumes not aristate:—

Umbels simple; spikelets bearing 1—3, rarely 4, nuts; transverse veinlets of leaves and bracts not visible:—

Roots producing stolons:—

Spikelets subulate, 1-flowered. Stolons long, scaly; stems slender, usually thickened into a nodule at the base, 2—24 in. long; leaves shorter or longer; bracts 3—6, up to 8 in. long; rays 3—7, 0—1.5 in. long, terminating

in dense cylindric spikes 2—7 in. long; glumes brown, 3rd striate; nut oblong-ellipsoid, often slightly curved, pale-brown.....3. *panicus*. Spikelets 2-flowered. Stolons short, very slender, scaly; stems slender, up to 12 in. long; leaves as long, very slender; bracts 4—5, up to 6 in. long; rays few, 0—1 in. long, spikes cylindric, lax, 3—1 in. long; glumes dusky-green; nut unknown.....4. *tenuifolius*.

Roots without stolons:—

Spikelets erect or suberect:—

Spikelets 2—4-flowered, subulate, often curved; rhachilla developed. Rhizome very short, nodulose; stems 4—24 in. high; leaves shorter or longer, up to 3 in. wide; bracts 4—8, up to 15 in. long and 3 in. wide; rays 5—11; spikes up to 1.5 in. long, sessile or peduncles up to 1.5 in. long; glumes obtuse, not cuspidate; nut obovate-oblong, obtuse, brown, muricate, usually slightly curved.....5. *cyperinus*.

Spikelets 1-flowered; rhachilla minute. Rhizome very short, hardly nodulose; stems 3—12 in. high; leaves shorter or longer, very narrow; bracts 4—7, 1—5 in. long, narrow; spikes cylindric, up to 7 in. long, sessile or up to 3 in. long; when sessile the umbel appears almost capitate; nut-bearing glume cuspidate. Other characters as in the last species.....6. *pictus*.

Spikelets spreading at right angles, cylindric, up to 1.5 in. long. Rhizome short, thick, creeping, clothed in the remains of old leaf-sheaths; stem 2.5—30 in. high; leaves usually much shorter, sometimes as long; bracts 4—11, 1—12 in. long; spikes 5—14, cylindric, up to 1.75 in. long, nearly sessile or peduncles up to 1.25 in. long; spikelets 1—2-flowered; nut-bearing glume cuspidate; nut narrowly elliptic-oblong, apex acute, dark-chestnut or nearly black, minutely muricate, slightly curved.....7. *Sieberianus*.

Umbels compound; spikelets bearing 5—14, rarely 3—4, nuts, 2—4 in. long; transverse veinlets of leaves and bracts more or less raised and distinct:—

Spikes cylindric or ovoid, 6—75 in. long; spikelets narrowly ovate or linear-lanceolate. Rhizome short; stems robust, bluntly trigonous, 1—3 ft. high; leaves shorter or longer, more or less spongy, up to 35 in. wide, margins of leaves and bracts sharply spinulose; bracts about 5, up to 38 in. long and 35 in. wide; primary rays up to 9, up to 3.5 in. long, some simple, others umbelled with 4—6 rays up to 75 in. long with 1—2 bracteoles up to 1 in. long; glumes broadly ovate, obtuse; strongly striate, greyish-brown; nut broadly ellipsoid, apiculate, black.....8. *pennatus*.

Spikes globose, 3—7 in. diam.; spikelets linear-subulate, 2—4 in. long. Rhizome short; stems spongy, terete or nearly so, 1—4 ft. high; leaves as long, up to 5 in. wide, spongy, margins smooth or scabrous; bracts 8 or more, 1.5—44 in. long, up to 5 in. wide, margins spinulose; primary rays 8—14, 75—6 in. long, secondary up to 13, 3—2 in. long, tertiary fewer and shorter; bracteoles up to 2 in. long, about as many as the rays; glumes narrow, much convoluted, subacute, reddish-brown; rhachilla with a broad hyaline wing; nut narrowly oblanceolate-oblong, distinctly beaked, brown, iridescent, minutely muricate.....9. *compactus*.

Spikelets markedly compressed, 6—26-flowered, 3—1.1 in. long; glumes elliptic with a curved arista, brown. Roots fibrous; stems tufted, slender, often capillary, 1.5—7 in. high; leaves as long, filiform; bracts few, up to 6 in. long; umbel subsimple; rays few, usually under 1 in. long; spikes broad-quadrate, usually a few sessile, up to 5 in. long, with 6—20 lax spikelets; nut narrowly oblong, acute, brown.....10. *squarrosus*.

1. *MARISCUS DUBIUS*, Kükenthal n. comb. *Cyperus dubius*, Rottb. Desc. et. Ic. 20. *Mariscus Dregeanus*, Kunth; F. B. I. vi. 620.
In all the E. Districts; Mysore, Nilgiri and Pulney Hills up to 6,000 ft.; Travancore.
2. *MARISCUS BULBOSUS*, C. B. Clarke; F. B. I. vi. 620.
Horsleykonda at 4,000 ft. (Gamble); Chingleput, Salem and Tinnevely Districts.

3. *MARISCUS PANICEUS*, Vahl; F. B. I. vi. 620.
Carnatic; Mysore; N. Coimbatore, Nilgiri, Anamalai and Pulney Hills; Travancore. From near sea-level to 7,000 ft.
4. *MARISCUS TENUIFOLIUS*, Schrad.; F. B. I. vi. 622.
Tinnevely Hills (Beddome).
5. *MARISCUS CYPERINUS*, Vahl; F. B. I. vi. 621.
In all Districts except the wettest; 1,500—7,000 ft.
Var. *bengalensis*, C. B. Clarke; F. B. I. vi. 621.
Umbel contracted into a quasi head; spikelets linear, bearing 2—4 nuts.
Kotagiri in the Nilgiri Hills at 6,500 ft. (Sedgwick).
6. *MARISCUS PICTUS*, Nees; F. B. I. vi. 621.
Mysore and Nilgiris.
7. *MARISCUS SIEBERIANUS*, Nees; F. B. I. vi. 622.
Nilgiri, Anamalai (Beddome) and Pulney Hills; High Wavy Mountains (Jacob); Travancore.
8. *MARISCUS PENNATUS*, Dom. *M. albescens*, Gaud.; F. B. I. vi. 623.
Near the sea on both coasts.
One of the sedges used for mat-making.
9. *MARISCUS COMPACTUS*, Druce. *M. microcephalus*, Presl.; F. B. I. vi. 624.
Rampa Hills (Narayanswami); Mysore (Meebold); Chingleput and Malabar Districts; Travancore; 300—3,000 ft.
10. *MARISCUS SQUARROSUS*, C. B. Clarke; F. B. I. vi. 623.
Chingleput, Coimbatore, Madura and S. Kanara Districts; Cochin and Travancore States; sea-level to 1,500 ft.

6. *Courtoisia*, Nees.

Erect herbs with simple stems and grass-like leaves only near the base. *Inflorescence* of globose, umbelled spikes. *Spikelets* compressed; rhachilla not winged, disarticulating above the 2 lowest glumes. Glumes distichous, the 2 lowest empty, the next 1—6 bearing 2-sexual flowers and dorsally winged, the uppermost empty or sterile. *Stamens* 3. *Style* short, persistent; stigmas 3, linear. *Nut* trigonous, apex acute, continuous with the style.

COURTOISIA CYPEROIDES, Nees; F. B. I. vi. 625.

Kurg; Mysore; Nilgiri Hills; Malabar; Carnatic.

In swampy situations. Vern. *Kan. Bili Sanna Jambu Hullu*. Stems tufted, 3—24 in. high; leaves shorter or longer, narrow, flaccid; bracts 3—7, 2·5—16 in. long; primary rays 5—9, up to 5 in. long, secondary fewer, up to 1 in. long; spikes congested, 2—5 in. diam.; spikelets flat, 1·5 in. long, usually bearing 2 nuts, rarely 1; glumes yellowish-brown, 12 in. long, boat-shaped, flattened, the whole length of the keel winged; nut narrowly fusiform, dark-brown.

7. *Eleocharis*, R. Brown.

Herbs with a stout rhizome or fibrous roots, sometimes stoloniferous. *Stems* simple, tufted, terete, angled or fluted. *Leaves* reduced

to sheaths embracing the base of the stem, rarely with a short herbaceous or membranous limb. *Inflorescence* a solitary terminal, subglobose, ovoid or cylindrical, few- or many-flowered spikelet which is sometimes proliferous. *Glumes* imbricate round the rhachilla in 3—many spirals, the lowest usually empty and bract-like, often longer than the rest but always shorter than the spikelet, the uppermost glumes empty, the intervening 2-sexual. *Stamens* 3—1. *Hypogynous bristles* 3—9, rarely absent, though sometimes small, retrorsely scabrous or spinulose. *Style* 2—3, rarely 4-fid, papillose, base swollen and usually constricted just above the nut, usually persistent. *Nut* obovoid, usually plano-convex when the style is 2-fid and trigonous when it is 3-fid.

Stem robust; spikelets narrower or hardly wider than the stems.

Stolons elongate:—

Glumes smooth, apex rounded or truncate, hyaline margins usually narrow:—

Glumes broadly ovate, straw-coloured, .2—2.5 in. long, midrib strong, usually raised. Stems terete, transversely septate within; septae usually visible outside when dry, 12—41 in. high; spikelets cylindric, .75—2 in. long; bristles 7, as long as the nut or longer, yellow; nut orbicular-obovoid, plano-convex or trigonous, smooth, pale-brown.....1. *plantaginea*.

Glumes closely imbricate, quadrate, straw-coloured, .1—1.25 in. long, without midrib. Stem trigonous upwards, not septate, 12—30 in. high; spikelets cylindric, .6—1 in. long; bristles much shorter than the nut, brown; nut orbicular-obovoid, trabeculate, pale, shining.....2. *spiralis*.

Glumes much striated, elliptic-oblong, brown, .17—2 in. long, apex narrowed, obtuse, hyaline margins usually broad. Stems trigonous upwards, not septate, 6—36 in. high; spikelets cylindric, .5—1.7 in. long; bristles 6, slightly longer than the nut, brown; nut orbicular-obovoid, biconvex, pale- or dark-brown, faintly striate.....3. *fistulosa*.

Stem slender; spikelets markedly wider than the stem:—

Style 2-fid; nut biconvex. Stolons 0:—

Bristles glistening-white. Stems filiform, 1—7 in. high; spikelets ovoid or subglobose, .06—2.5 in. long; glumes broadly ovate-oblong, back green, sides membranous, purplish-brown; bristles 4—7, as long as the nut; nut obovoid, smooth, dark-brown or black, polished.....4. *atropurpurea*.

Bristles reddish-brown. Stems 2—14 in. high; spikelets subglobose or conical-ovoid, .1—2 in. long; glumes orbicular-ovate, membranous, pale-brown, often with a reddish tinge; bristles 4—7, usually longer than the nut, reddish-brown; nut obovoid, dark-brown or black, polished.....5. *capitata*.

Style 3-fid; nut trigonous:—

Stems fluted, hardly angled:—

Nut prominently trabeculate; style-base nearly as broad as the nut. Stolons 0; stems filiform, 1—7 in. high; spikelets narrowly ellipsoid or ovoid, .05—1.5 in. long; glumes 6—8, boat-shaped, subacute, back narrowly green, sides hyaline with a chestnut band; bristles about 6, as long as the nut, pale-brown; nut pale straw-coloured.....6. *Chaetaria*.

Nut smooth; style-base narrow. Stolons slender; stems rigid, 3—18 in. high; spikelets narrowly elliptic or ovoid, .2—4 in. long, frequently producing a branchlet from the axil of the lowest empty glume which may bear a smaller subsidiary spikelet; glumes many, ovate- or elliptic-oblong, lower obtuse, upper subacute, hyaline or green along the midrib, margins reddish- or purplish-brown; bristles 6—7, longer than the nut, pale- or dark-brown; nut obovoid, obscurely trigonous, pale, smooth.....7. *congesta*.

Stems sharply 4- (sometimes 3-) angled, 8—36 in. high. Stolons slender; spikelets narrowly ellipsoid to cylindric-lanceolate, .4—1 in. long; glumes numerous, ovate, obtuse, yellow along the midrib, sides reddish-brown; bristles about 6, longer than the nut, glistening red-brown, very scabrid; nut obovoid, yellow, smooth; style-base elongate-obpyramidal, 4-sided, fuscous, scabrid

8. *tetraquetra*.

1. *ELEOCHARIS PLANTAGINEA*, R. Br.; F. B. I. vi. 625.
Mysore; Coimbatore; Carnatic; Travancore. In swamps, from near sea-level to 3,000 ft.
 2. *ELEOCHARIS SPIRALIS*, R. Br.; F. B. I. vi. 627.
Carnatic; in swamps.
 3. *ELEOCHARIS FISTULOSA*, Schult.; F. B. I. vi. 626.
Mysore; Coimbatore; S. Kanara. In swamps from near sea-level to 3,000 ft.
 4. *ELEOCHARIS ATROPURPUREA*, Kunth; F. B. I. vi. 627.
Carnatic; S. Kanara. At low levels.
 5. *ELEOCHARIS CAPITATA*, R. Br.; F. B. I. vi. 627.
In all Districts in rice-fields and moist sandy localities; from sea-level to 2,000 ft.
 6. *ELEOCHARIS CHAETARIA*, Roem. & Sch.; F. B. I. vi. 629.
Mysore; S. Kanara; Travancore. In drying swamps and rice-fields; from near sea-level to 3,000 ft.
- Var. *subvivipara* Fischer n. comb. *E. subvivipara*, Boeck.; F. B. I. vi. 629. Stems taller, up to 12 in. long; spikelets frequently viviparous. Nilgiri Hills; Travancore.
7. *ELEOCHARIS CONGESTA*, D. Don; F. B. I. vi. 630.
Nilgiri and Pulney Hills; 5,000—7,000 ft.
 8. *ELEOCHARIS TETRAQUETRA*, Nees; F. B. I. vi. 630.
Nilgiri and Pulney (Bourne) Hills; 6,000—7,000 ft.

8. *Fimbristylis*, Vahl.

Herbs, usually erect, with a short rhizome or fibrous roots, rarely stoloniferous. *Stems* usually tufted. *Leaves* narrow, from near the base of the stem, sometimes all reduced to sheaths. *Inflorescence* terminal, umbellate, corymbose or reduced to a few spikelets or a single one. *Spikelets* solitary or clustered, usually many-flowered, the solitary usually pedicelled but frequently one or more in the corymb sessile. *Glumes* usually spirally imbricate but sometimes the lower or all distichous, usually glabrous, deciduous from the base upwards, the lowest 1—3 empty, the uppermost few tabescent, the intermediate 2-sexual. *Stamens* 1—3. *Bristles* 0. *Style* long, 2—3- (rarely 4-) fid, usually more or less pubescent or villous, base dilated and constricted just above the nut, persistent or wholly deciduous leaving no button on the nut. *Nut* biconvex or trigonous, often stalked, smooth or tubercled, often trabeculate by the transverse superficial cells or reticulate by small rounded or hexagonal cells.

Glumes spirally disposed (sometimes distichous in 17. *nigrobrunnea*):—

Spikelets 1—5:—

Style 2-fid; nut biconvex:—

Leafless or nearly so; bracts 0:—

Nut linear-oblong, slightly narrowed below, pale-straw-coloured, .06 in. long, trabeculate in about 9 vertical series, not fluted, stalked, deciduous with the glume. Roots fibrous; stems quadrangular, 4—26 in. high; leaves 0, the uppermost sheath sometimes with a short limb; spikelet solitary, ovoid or conical, .25—.4 in. long, rarely cylindric-conical and up to .8 in. long; glumes oblong or obovate-oblong, rounded, .13 in. long, nearly flat, not keeled.....1. *tetragona*.

Nut subglobose obovoid, transversely fluted:—

Spikelet continuous with the stem, lanceolate, .2—4 in. long. Roots fibrous; stems obtusely quadrangular, 2—12 in. high; leaves 0; glumes ovate, subacute, .14—17 in. long, not plicate, pale with a green excurrent keel; nut .07 in. long, pale-straw-coloured.....2. *acuminata*. Spikelet usually set obliquely on the stem, ovate-lanceolate, .25—5 in. long. Rootstock creeping; roots fibrous; stems terete, 8—18 in. high; leaves 0, sheaths with a very short mucronate, ovate limb bordered with brown; glumes orbicular or very broadly ovate, nearly flat, not keeled, rounded, apiculate, .17 in. long, brown; nut whitish .05—06 in. long
3. *nutans*.

Leaves several:—

Glumes narrowly oblong, nearly flat in flower, boat-shaped in fruit, obtuse, slightly keeled, pale-brown or whitish, sometimes reddish towards the apex, .1 in. long. Root fibres slender; stems slender, striate, 1—15 in. high; leaves $\frac{1}{2}$ to as long, slender; spikelets solitary, oblong-ellipsoid, .2—3 in. long; bracts 0, but the lowest glume sometimes with a leaf-like appendage up to 1 in. long resembling a bract or an extension of the stem; nut obpyriform, apex subtruncate, sessile, .06 in. long, pale- or dark-brown, minutely papillose, papillae often whitish

4. *polytrichoides*.

Glumes suborbicular or very broadly ovate, usually shortly apiculate, slightly concave, not keeled, pale-brown, 1.1—1.4 in. long. Root fibres slender; stems slender, rigid, striate, 3—16 in. high; leaves $\frac{1}{2}$ as long to a little longer, slender; spikelets ovoid, .2—32 in. long, solitary or 2—5 in a simple irregular umbel, 1 or 2 sessile at the forks, the others terminating rays up to 1 in. long; bracts 2, usually shorter than, but sometimes one exceeding the spikelet; nut suborbicular-obovoid, straw-coloured, smooth, .06—08 in. long, stalked.....5. *schoenoides*.

Style 3-fid; nut trigonous, obovoid, apex subtruncate, .05—06 in. long, black or dark-brown, minutely tubercled. Rhizome very short; stems slender, obtusely angled, glabrous or shortly laxly hairy, 3—18 in. high; leaves $\frac{1}{2}$ — $\frac{3}{4}$ as long; slender, usually channelled, shortly hairy; spikelets solitary, ovoid-ellipsoid, .3—6 in. long; bract 0, rarely 1 up to 1.2 in. long; glumes broadly oblong, obtuse, concave, .12—18 in. long, chestnut, not keeled.....6. *Kingii*.

Spikelets many, umbellate (rarely reduced to a few in depauperated specimens):—

Style 2-fid (rarely casually 3-fid); nut flattened:—

Spikelets solitary, the majority peduncled:—

Margins of glumes not white or hyaline:—

Spikelets globose or oblong-cylindric, echinate with the curved awns of the glumes, .25—4 in. long. Roots fibrous; stems slender, .5—6 in. high; leaves usually shorter, sometimes as long, filiform; umbels simple or compound, often dense; rays variable in number, up to 1 in. long; bracts several, filiform, often overtopping the umbel; glumes narrowly elliptic, pale with a green nerve excurrent as a long awn, .06—08 in. long; nut nearly cylindric, .02—03 in. long, brown, glabrous or with a few thick capitate hairs.....7. *dipsacea*.

Spikelets ellipsoid or ovate-oblong:—

Spikelets angled by the prominent keels of the glumes, narrowly ellipsoid, .15—3 in. long. Roots fibrous; stems 1—10 in. high; leaves shorter or as long, narrow, more or less pubescent; sheaths usually pubescent; umbels compound or decompound, rays few to many, up to 1 in. long; bracts shorter or longer than the umbel, more or less pubescent; glumes ovate, reddish-brown, usually puberulous, 1—3-nerved, .06—07 in. long, the midrib forming a conspicuous green keel prolonged into a cusp, sometimes to a short, curved awn; nut broadly obovoid, pale- to dark-brown, smooth, more or less trabeculate, .025—03 in. long.....8. *bis-umbellata*.

Spikelets not angled:—

Glumes glabrous, broadly ovate, concave, keeled, apiculate, .1 in. long, reddish-brown. Rhizome short or 0; stems slightly swollen at base, striate or obscurely angled, up to 24 in. high; leaves usually shorter, sometimes longer, coriaceous, linear, flat, glabrous

or more or less densely pubescent; umbels usually decompound, sometimes contracted; rays few, up to 1.5 in. long; bracts few, shorter or longer than the umbel; spikelets ovoid, acute, .2—3 in. long; nut broadly obovoid, pale-brown, trabeculate, .05 in. long
9. *dichotoma*.

Glumes more or less puberulous:—

Glumes ferruginous-brown, hoary-puberulous outside in the apical half, glabrous and usually paler in the basal half, broadly elliptic-ovate, apiculate, concave, .15—17 in. long, keel green. Rhizome 0 or very short; roots fibrous; stems subangular or slightly flattened, 8—30 in. high; leaves often 0, sometimes up to 6 in. long, narrow, margins scabrous; sheaths thin, glabrous or puberulous, mouth truncate, minutely ciliate; umbels usually simple of 5—10 rays up to 1 in. long; bracts 2—4, shorter or longer than the umbel, up to 4 in. long; spikelets ellipsoid, .35—5 in. long; nut broadly obovoid, umbonate, shortly stalked, smooth, pale-yellow, .06—07 in. long.....10. *ferruginea*.

Glumes brown-puberulous outside all over, ovate, apiculate, hardly keeled, boat-shaped, .08—09 in. long. Rhizome short or 0; roots fibrous; stems subangular or slightly compressed, 10—20 in. high; leaves shorter, up to 12 in. long, few, very narrow, margins smooth; sheaths glabrous, mouth oblique, glabrous or sparsely ciliate; umbels compound; primary rays 8—10, up to 2 in. long, partial rays fewer and shorter; bracts up to 2 in. long; spikelets narrowly ellipsoid, .25—35 in. long; nut broadly obovoid, apex rounded, apiculate, shortly stalked, fuscous-brown, minutely reticulate, .04 in. long.....11. *compressa*.

Margins of glumes broadly white or hyaline. Rhizome short or long; root fibres long; stems rigid, obtusely trigonous, swollen at the base, 2—18 in. high; leaves much shorter, rarely as long, crowded on the rootstock, rigid, narrow, flat or margins incurved, glabrous; umbels simple or compound, often contracted with clustered spikelets; rays up to 1.5 in. long; bracts short, erect, rigid; spikelets ellipsoid or ovoid, .15—25 in. long; glumes broadly ovate, obtuse, sometimes minutely apiculate, keeled, .06—08 in. long, brown; nut obovoid, apex rounded, .04 in. long, black, minutely tubercled.....12. *spathacea*.

Spikelets clustered, all sessile:—

Clusters of spikelets in a single head. Rhizome 0:—

Spikelets cylindric, .17—27 in. long, .06—08 in. wide. Root fibres slender; stems numerous, slender, subtrigonous, 1—8 in. high; leaves usually shorter, very slender, glabrous, canaliculate; bracts 3—5, up to 3 in. long; glumes ovate, subacute, .05 in. long, brown or silvery-grey, keel green; nut orbicularly obovoid, .02 in. long, shortly stalked, pale, exterior cells obscure.....13. *argentea*.

Spikelets ovoid-ellipsoid, .18—2 in. long, .1 in. wide. Root fibres rather stout; stems few, compressed, 6—12 in. high; leaves half as long, narrow, flat; bracts 2, suddenly acute, up to 1 in. long; glumes lanceolate, subacute, boat-shaped, not keeled, .08 in. long, pale-brown or greyish; nut obovate, shortly stalked, .03—04 in. long, exterior cells transverse, conspicuous.....14. *albicans*.

Clusters of spikelets umbelled. Rhizome thick, woody, up to 6 in. long, sometimes branched; stems rigid, terete or slightly angled, glabrous or minutely white-silky, 1.5—8 in. high; leaves $\frac{1}{2}$ as long, numerous, closely imbricating, coriaceous, ligulate, curved, appressed ashy- or brown-silky; umbels simple or compound, one cluster sessile and 2—5 with peduncles (rays) up to 1 in. long; bracts 2—3, silky, up to .75 in. long; spikelets ellipsoid-oblong, acute .2—25 in. long; glumes ovate, subacute, keeled, .13 in. long, ashy-silky; nut obovate, apex rounded, smooth, pale-brown, .06 in. long.....15. *sericea*.

Style 3-fid (rarely casually 2-fid); nut trigonous:—

Spikelets solitary, mostly peduncled:—

Rhizome present, often woody:—

Spikelets not contorted:—

Whole plant glabrous or nearly so (margins of leaves and ribs of rays scabrid in 21. *complanata*):—

Margins of glumes hyaline or scarious:—

Leaves 0 or few, very slender, finely acuminate, longer or shorter than the stem. Rhizome small; root fibres slender; stems weak, angled, up to 30 in. high; umbel decomposed; rays many, slender, up to 3 in. long; bracts filiform, shorter than the umbel; spikelets very numerous, ellipsoid or ovoid, .15—2 in. long; glumes broadly ovate, .07 in. long, keeled, apiculate, pale-brown, margins hyaline; nut globosely obovoid, .02—03 in. long, pale-brown, minutely tubercled, exterior cells transverse.....16. *quinquangularis*.
Leaves several, ligulate, apex obtuse. Stems rigid; margins of glumes scarious, nut obovoid-elliptic, trabeculate

26. *junciformis* var. *abbreviata*.

Margins of glumes neither hyaline nor scarious:—

Stems not markedly flattened:—

Leaves ligulate, flat; spikelets over .25 in. long:—

Spikelets ovoid, sometimes compressed with distichous glumes, .25—55 in. long, .13—16 in. wide. Rhizome short, woody; stem slender, angular, up to 24 in. long; leaves usually much shorter, numerous, narrowly ligulate, tip rounded or suddenly acute; umbel simple or compound; rays 3—6, .5—2 in. long, bearing comparatively few spikelets; bracts very short, rigid, usually erect; glumes broadly triangular-ovate when unfolded, coriaceous, cuspidate, .13—16 in. long, keel slender, very dark-brown, shining; nut broadly obovoid, .04 in. long, pale-brown, minutely tubercled.....17. *nigrobrunnea*.

Spikelets narrowly lanceolate, terete, .75—1 in. long, .15—2 in. wide. Rootstock short; stems slender, angled, up to 24 in. high; leaves much shorter, several, narrowly ligulate, rigid, tip rounded; umbels simple or compound; rays 3—5, rigid, up to 2 in. long, each with 1—3 spikelets; bracts 2—3, shorter than the spikelets; glumes ovate, boat-shaped, .2—25 in. long, rigid, cuspidate, reddish-brown, the slender keel paler, nut broadly obcordate, .05 in. long, apiculate, faces concave, angles rounded, greyish-brown, subtubercled.....18. *insignis*.

Leaves filiform, numerous, $\frac{1}{2}$ — $\frac{3}{4}$, the length of the stems. Rhizome short, woody; stems slender, obtusely angled, up to 2 ft. high; umbels decomposed; primary rays 3—10, very slender, up to 2 in. long; spikelets narrowly oblong or linear-lanceolate, .2—25 in. long; glumes lanceolate, acuminate, cinnamon-brown, margins paler, glandular, .14 in. long; nut narrowly oblong-obovoid, greyish-brown, .03—04 in. long, minutely stalked.

19. *cyperoides*, var. *cinnamometorum*.

Stems distinctly flattened near the umbel, usually 2-edged, 8—36 in. long. Rhizome short, woody, sometimes absent; root fibres wiry; leaves crowded at the base, flat, linear, suddenly narrowed, obtuse or subacute, margins scaberulous near the apex, usually much shorter than the stem, sometimes nearly as long; umbels decomposed, effuse; bracts 2—4, usually shorter than the inflorescence, sometimes as long; rays 5—10, usually flattened, up to 6 in. long, corymbosely branched; spikelets many, ovoid or narrowly oblong, .15—3 in. long; glumes ovate, complicate, brown, keel strong, produced into a distinct mucro, .08—1 in. long; nut obovoid, .02—03 in. long, pale straw-coloured or whitish, minutely tubercled.....20. *complanata*.

Leaf-sheaths and stems more or less hairy; bracts and bracteoles hoary-pubescent. Rhizome short, creeping; stems thickened at the base, 5-angled, usually deeply grooved, 10 in.—5 ft. high; leaves 0; sheaths 3—4, lax, lowest short, coriaceous, upper membranous, longer, uppermost up to 6 in. long, limb short scarious; umbels compound; bracts short, ovate, caudate; rays 3—10, up to 1.5 in. long; partial rays fewer and shorter; spikelets elliptic, nearly terete, .14—25 in. long; glumes broadly ovate, concave, keel usually produced into a short cusp,

chestnut-brown, margins narrowly hyaline, .1—15 in. long; nut globosely obovoid, apiculate, stalked, very pale to pale-brown, trabeculate, .05 in. long.....21. *pentaptera*.

Spikelets contorted, narrowly cylindric, .2—5 in. long. Rhizome stout, woody; stems solitary or twin, rigid, terete, striate or shallowly ribbed, up to 25 in. high; leaves usually much shorter, sometimes as long, numerous, flat, up to .17 in. wide, margins scabrid near the suddenly acute apex; umbels decomposed; bracts 4—5, shorter than the inflorescence, margins scabrid; primary rays 6—8, terete or somewhat compressed, up to 3.5 in. long, partial rays fewer and shorter; glumes broadly ovate when expanded, .1 in. long, subacute, keeled, pale reddish-brown, margins hyaline; nut narrowly obovate, .04 in. long, shortly stalked, pale-brown, exterior cells transversely oblong.....22. *contorta*.

Rhizome absent (unknown in 23. *Arnottiana*):—

Glumes obtuse:—

Spikelets broadly ellipsoid, .2 in. long, .1—12 in. wide. Rootstock and leaves unknown; stem sharply 5-angled, glabrous, up to 14 in. or more long; umbel decomposed; bracts 3—4, very narrow, up to .6 in. long, margins scabrid; primary rays 7—8, up to 1.3 in. long, partial ones fewer and shorter; glumes broadly ovate, concave, sometimes apiculate, hardly keeled, chestnut, .08—0.9 in. long; nut narrowly obovate, minutely apiculate, shortly stalked, .04 in. long, pale-brown, transversely lineolate, faintly tubercled.....23. *Arnottiana*. Spikelets subglobose, .09—11 in. long. Root fibres slender; stems weak, 4—5-angled upwards, 2—20 in. high; leaves shorter or longer, narrow, acuminate; umbel decomposed; bracts 2—3, filiform from a broad base, much shorter than the inflorescence; primary rays 4-many, slender, somewhat compressed, up to 2 in. long, partial ones fewer and shorter; glumes broadly ovate, concave, keeled, .05 in. long, brown or pale-chestnut; nut narrowly obovate, sharply or obtusely 3-angled, minutely tubercled, yellowish-brown, .02 in. long

24. *miliacea*.

Glumes acute, ovate-lanceolate, keel shortly excurrent and strongly incurved at the base, glandular-puberulous or glabrous, .08—1 in. long, brown or yellowish brown, margins scarious. Roots fibrous; stems tufted, 4—5-angled, angles smooth or scabrid, 4—14 in. high; leaves $\frac{1}{2}$ —3 as long, rarely as long, almost filiform; umbels simple or subcompound; bracts 2—3, short, setiform; rays 2—4, up to 1 in. long, bearing 1—3 spikelets; spikelets ellipsoid or oblong-ellipsoid, .15—25 in. long; nut globosely obovoid, .03 in. long, greyish-white, tubercled.....25. *tenera*.

Spikelets clustered, all sessile:—

Umbels decomposed:—

Leaves many, much shorter than the stem, nearly filiform (broader and ligulate in var. *latifolia*), not exceeding .15 in. wide at the base; sheaths short, open. Rhizome woody, short or creeping; stems 4—5-angled or slightly compressed, smooth, 4—18 in. high; bracts 2—4, much shorter than the inflorescence, rigid, erect; primary rays 3—6, up to 2 in. long; spikelets in clusters of 3—6 (solitary in var. *abbreviata*), narrowly oblong or ovoid, .16—25 in. long; glumes ovate, shortly mucronate, keel slender, pale- or fuscous-brown, margins scarious, .08—1 in. long; nut obovoid, brown or pale, .05 in. long, minutely tubercular.....26. *junciformis*. Leaves 0 or several, as long as the stem, narrowly ligulate, .3—5 in. wide at the base; sheaths coriaceous, closed, the uppermost up to 6 in. long. Rootstock unknown; stem swollen at the base, 5-angled, angles scabrid, up to 2 ft. high; bracts lanceolate, caudate, margins setulose-scabrid, much shorter than the inflorescence; primary rays about 8, ribbed, ribs scabrid, up to 2 in. long; spikelets numerous, ellipsoid, .2 in. long; glumes broadly ovate when expanded, .14 in. long, strongly keeled, shortly cuspidate, reddish-brown, margins paler; nut obovoid-elliptic, pale-brown, .05 in. long, trabeculate.....27. *aggregata*.

Umbels simple:—

Glumes ovate, apical half glandular, keel or the whole glume often puberulous, minutely mucronate, dark, margins membranous and paler.

Rhizome oblique; stems slender, obscurely 4—5-angled, up to 15 in. long; leaves $\frac{1}{2}$ — $\frac{3}{4}$ as long, very narrow, usually deeply channelled, margins minutely scabrid near the apex; bracts 3, the lowest sometimes longer than the inflorescence, spinulose-scabrid; the apex often puberulous; rays 5—7, up to 1 in. long; spikelets in clusters of 2—7, sometimes solitary, ovate or ellipsoid, .15— $\frac{1}{4}$ in. long, style sometimes 4-fid; nut minute, depressed-obovoid, dark, trabeculate...28. *paupercula*. Glumes ovate, glabrous, keel shortly produced as a mucro, .12—15 in. long, dark-chestnut, margins narrowly scarious and pale. Rhizome short, woody; stems slender, obscurely angled, 1.5—12 in. long; leaves $\frac{1}{4}$ — $\frac{1}{2}$ as long, subsetaceous, rigid; umbels sometimes contracted into a single head; bracts 1—3, setaceous from a broad base, usually very short, sometimes up to 1.5 in. long; spikelets 2—7 together, very rarely solitary, sessile or with peduncles up to .5 in. long, ellipsoid-oblong, .2—33 in. long; nut obovoid, minutely stalked, pale, smooth, .05 in. long.

29. *uliginosa*.

Glumes distichous:—

Glumes broad, strongly cuspidate:—

Spikelets solitary, sometimes 2—3, broadly ovate, usually much compressed, sometimes slightly contorted, .2—5 in. long, .17—25 in. wide. Rhizome small; stems tufted, very slender, angled, 2—18 in. high; leaves usually $\frac{1}{2}$, sometimes as long or longer, filiform, channelled, smooth; sheaths membranous; bract 0 or 1, erect, shorter than the spikelet or as long; glumes coriaceous, very broadly ovate, strongly keeled, acute, smooth, .15—2 in. long, pale straw-coloured, shining, the empty basal glumes often aristate; nut pear-shaped with a distinct stalk, .08—1 in. long, densely tubercled, the tubercles often showing through the glume.....30. *monostachya*.

Spikelets 2—5 in a simple umbel, rarely solitary, ovate- or oblong-lanceolate, .5—1 in. long, .15—33 in. wide, somewhat compressed, sometimes slightly contorted. Rhizome short, woody; stems rigid, obscurely angled, 9—30 in. high; leaves $\frac{1}{2}$ as long, narrow, rigidly pointed, concave, margins spinulose-scabrid towards the base; sheaths coriaceous; rays 1—4, up to 2.5 in. long; bracts 1—2, erect, rigid, up to 1 in. long, margins usually scabrid; glumes coriaceous, broadly ovate, strongly keeled, smooth, .25—32 in. long, pale-brown or yellowish; nut subglobose obovoid with a long stalk, 3-ribbed, dark-brown, .1—13 in. long, minutely tuberculate.....31. *tristachya*.

Glumes broadly triangular when unfolded, subacute, weakly keeled, not cuspidate, glabrous or the keel minutely scabrid, .08—12 in. long, pale-brown, margins paler, the upper ones sometimes more or less spirally arranged. Rhizome 0; roots fibrous; stems tufted, slender, obtusely quadrangular, 4—8 in. high; leaves very narrowly ensiform, 1.75—4 in. long; rays 1—4, up to 1.2 in. long, capillary; bracts 1 to each ray, up to .25 in. long; spikelets lanceolate, .2—35 in. long; nut obpyramidal, truncate, .025—04 in. long, very pale-brown, white-tubercled.....32. *Narayanii*.

1. *FIMBRISTYLIS TETRAGONA*, R. Br.; F. B. I. vi. 631.

Mysore; Malabar; Coimbatore; Nilgiri Hills; Kambakkam Hills; sea-level to 3,000 ft.

2. *FIMBRISTYLIS ACUMINATA*, Vahl; F. B. I. vi. 631.

Mysore; S. Kanara; Travancore; sea-level to 3,500 ft.

3. *FIMBRISTYLIS NUTANS*, Vahl; F. B. I. vi. 632.

Kambakkam Hills at 200 ft. (Fischer).

4. *FIMBRISTYLIS POLYTRICHOIDES*, R. Br.; F. B. I. vi. 632.

E. Coast from Godavary District southwards; near the sea.

5. *FIMBRISTYLIS SCHOENOIDES*, Vahl; F. B. I. vi. 634.

Mysore; Cuddapah Hills; Carnatic; Courtallam; near sea-level to 3,500 ft. Vern. *Kan. Kadu Gundu Hullu*.

6. *FIMBRISTYLIS KINGII*, C. B. Clarke; F. B. I. vi. 633. *F. trabeculata*, C. B. Clarke; F. B. I. vi. 633.

Nilgiri and Pulney Hills, 6,000 ft. upwards; Artapadi Valley at 5,300 ft. (Fischer).

7. FIMBRISTYLIS DIPSACEA, Benth.; F. B. I. vi. 635.

S. Kanara; Mysore; Carnatic; Quilon.

8. FIMBRISTYLIS BIS-UMBELLATA, Bub. *F. dichotoma*, auc. non Vahl; F. B. I. vi. 635. *F. aestivalis*, Vahl; F. B. I. vi. 637.

In all Districts, especially in rice-fields; near sea-level to 4,000 ft. Vern. *Tam.* Kadu korai; *Kan.* Kadu Sabbasigai Hullu, Niru Sabbasigai Hullu.

Var. *hirtistyla*, Fischer, var. nov. The base of style furnished with villous hairs resembling those of *F. squarrosa*, Vahl.

Mysore; Pulney and Tinnevely Hills.

9. FIMBRISTYLIS DICHOTOMA, Vahl. *F. annua*, Roem. & Sch. var. *diphylla*, Kükenthal. *F. diphylla*, Vahl; F. B. I. vi. 636.

In all Districts; sea-level to 6,000 ft.

10. FIMBRISTYLIS FERRUGINEA, Vahl; F. B. I. vi. 638,

In all Districts, usually in the drier tracts, but also in Malabar and at Quilon; sea-level to 6,000 ft.

11. FIMBRISTYLIS COMPRESSA, Boeck.; F. B. I. vi. 639.

Madras Peninsula (Wight, Roxburgh).

12. FIMBRISTYLIS SPATHACEA, Roth.; F. B. I. vi. 640.

Near the sea on both coasts; Kowdalli in N. Coimbatore (Jacob).

13. FIMBRISTYLIS ARGENTEA, Vahl; F. B. I. vi. 640.

Mysore; Cuddapah; Chittoor; Nilgiris; Malabar; Travancore; Tinnevely; usually at low elevations up to 4,000 ft.; sometimes growing in clefts of rocks. Vern. *Kan.* Bettada Vusamani Hullu.

14. FIMBRISTYLIS ALBICANS, Nees; F. B. I. vi. 641.

Deccan (Wight).

15. FIMBRISTYLIS SERICEA, R. Br.; F. B. I. vi. 641.

Ganjam in coastal sands (Lawson, Gamble).

16. FIMBRISTYLIS QUINQUANGULARIS, Kunth; F. B. I. vi. 644.

Rampa District (Narayanswami); Mysore; Carnatic.

Var. *crassa*, C. B. Clarke; F. B. I. vi. 644. Much more robust; rhizome woody; stems rigid, sharply angled; leaves 0; sheaths long. Nilgiri, Anamalai and Pulney Hills at 6,000 ft.; Mysore at 3,000 ft. (Meebold).

17. FIMBRISTYLIS NIGROBRUNNEA, Thw.; F. B. I. vi. 648.

Nilgiri, Anamalai, Pulney and Tinnevely Hills.

18. FIMBRISTYLIS INSIGNIS, Thw.; F. B. I. vi. 645.

Anamalai Hills (Beddome).

19. FIMBRISTYLIS CYPEROIDES, R. Br., var. *CINNAMOMETORUM*, C. B. Clarke; F. B. I. vi. 650.

Cuddapah (Gamble); Carnatic; Anamalai Hills (Beddome); S. Kanara (Hohenacker); Pulney, Travancore and Tinnevely Hills; near sea-level to 3,000 ft.

20. FIMBRISTYLIS COMPLANATA, Link; F. B. I. vi. 646.

In all Districts; sea-level to 3,000 ft.

21. *FIMBRISTYLIS PENTAPTERA*, Kunth ; F. B. I. vi. 645.
Pulney Hills (Saulière); High Wavy Mountains (Blatter & Hallberg, Jacob).
22. *FIMBRISTYLIS CONTORTA*, Fischer in Kew Bull. 1931, p. 45.
Courtallam.
23. *FIMBRISTYLIS ARNOTTIANA*, Boeck. ; F. B. I. vi. 643.
Cannanore.
24. *FIMBRISTYLIS MILIACEA*, Vahl ; F. B. I. vi. 644.
In all Districts ; sea-level to 5,000 ft.
25. *FIMBRISTYLIS TENERA*, Roem. & Sch. ; F. B. I. vi. 642. *F. monticola*, Steud. ; F. B. I. vi. 642.
S. Kanara ; Mysore ; Bellary ; Chingleput ; Nilgiri and Anamalai (Beddome) Hills ; Travancore.
26. *FIMBRISTYLIS JUNCIFORMIS*, Kunth ; F. B. I. vi. 647.
Vizagapatam ; Cuddapah ; Chingleput ; N. Coimbatore ; Nilgiris ; near sea-level to 3,000 ft.
Var. *latifolia*, C. B. Clarke ; F. B. I. vi. 648.
Leaves broader, flat or slightly concave, curved and twisted ; sometimes some of the spikelets solitary.
Dekkan.
Var. *abbreviata*, C. B. Clarke ; F. B. I. vi. 648.
Leaves narrow, flat ; spikelets mostly solitary, a few sometimes paired.
Anamalai Hills (Beddome) ; Travancore (Bourdillon) ; Courtallam (Jacob).
27. *FIMBRISTYLIS AGGREGATA*, Fischer in Kew Bull. 1931, p. 44.
Anamalai Hills (Beddome).
28. *FIMBRISTYLIS PAUPERCULA*, Boeck. ; F. B. I. vi. 647.
Nilgiri, Pulney, High Wavy and Tinnevely Mountains.
29. *FIMBRISTYLIS ULIGINOSA*, Steud. ; F. B. I. vi. 648.
Nilgiri and Pulney Hills ; 6,000—7,000 ft.
30. *FIMBRISTYLIS MONOSTACHYA*, Hassk. ; F. B. I. vi. 649.
In all Districts except the wettest ; sea-level to 4,000 ft.
31. *FIMBRISTYLIS TRISTACHYA*, Thw. ; F. B. I. vi. 649.
Nellore and Chingleput Districts.
32. *FIMBRISTYLIS NARAYANII*, Fischer in Kew Bull. 1931, p. 46.
Travancore ; Courtallam.

9. *Bulbostylis*, Kunth.

Annual herbs ; rhizome short or 0. *Stems* tufted, leafy only at the base. *Leaves* very narrow, rarely absent ; sheaths usually finely hairy. *Spikelets* of few to many flowers, flattened in umbelled or congested corymbs, sometimes reduced to a solitary one. *Glumes* imbricate on all sides, 1—2 lowest empty, the uppermost few tabescent, the intermediate 2-sexual. *Hypogynous bristles* 0. *Stamens* 1—3, usually 2. *Style* 3-fid, deciduous, as long as the nut, with a small bull-biform base which remains as a minute button on the apex of the nut when the style falls off. *Nut* obovoid, 3-gonous, smooth, hardly stalked.

Spikelets few to many in dense, terminal, globose heads:—

Stems slender, striate, 2—12 in. high; leaves half as long or a little more, glabrous or hispid-puberulous, sheaths pilose; bracts 3, shorter than the head or up to 2 in. long; spikelets linear-oblong, .1—3 in. long; glumes laterally compressed, lanceolate to cymbiform, .06—16 in. long, nearly glabrous, or more or less densely puberulous or minutely hispid, keel strong, straight or sigmoidally curved, mucous, apiculate or produced into a straight or curved awn up to half its length, margins usually hyaline; nut broadly obovoid, obtusely trigonous, smooth, straw-coloured, .025—03 in. long.....1. *barbata*. Stem thick, rigid, curved, often twisted, shallowly grooved, 1—3 in. long; leaves $\frac{1}{2}$ — $\frac{1}{2}$ as long, rigid, channelled, hispid-puberulous; bracts 3, up to .5 in. long; glumes rigid, hispid-puberulous. Other characters as in the last species

2. *subspinescens*.

Spikelets umbelled, rarely reduced to a single spikelet:—

Umbel lax, simple or compound, spikelets nearly all solitary and distant. Stems very slender, glabrous, 1—12 in. high; leaves usually shorter, capillary, apex pungent, glabrous, sheaths slenderly hairy at least near the mouth; bracts lanceolate, cuspidate or caudate, short, one sometimes up to .5 in. long; spikelets ellipsoid, .15—27 in long; glumes compressed, ovate-cymbiform, glabrous, dark-brown, .075 in. long, keel conspicuous, green, mucous or excurrent; nut obovoid, trigonous, .03—04 in. long, smooth, pale-straw coloured or fuscous

3. *capillaris* var. *trifida*.

Umbel usually congested, sometimes lax, spikelets usually closely packed. Stems slender, glabrous or puberulous towards the top, up to 15 in. high; leaves usually less than $\frac{1}{2}$ as long, slender, acuminate, usually puberulous, sheaths finely hairy at least at the mouth; bracts lanceolate, cuspidate, short; spikelets lanceolate, .15—2 in. long; glumes compressed, broadly cymbiform, brown, puberulous, .075 in. long, keel greenish, apiculate; nut broadly obovoid, sharply trigonous, .03—04 in. long, pale-straw coloured, transversely wrinkled.....4. *puberula*.

1. *BULBOSTYLIS BARBATA*, Kunth; F. B. I. vi. 651.

In all Districts; from sea-level to 4,000 ft. Vern. *Tam. Muk-kutikorei*; *Kan. Chavuri Hullu*.

Sometimes the whole plant turns reddish in drying.

2. *BULBOSTYLIS SUBSPINESCENS*, C. B. Clarke; F. B. I. vi. 652.

Waltair (Proudlock).

3. *BULBOSTYLIS CAPILLARIS*, Kunth, var. *TRIFIDA*, C. B. Clarke; F. B. I. vi. 652.

Bababudan, Nilgiri, Pulney and Travancore Hills; 6,000 ft. and upwards.

4. *BULBOSTYLIS PUBERULA*, Kunth; F. B. I. vi. 652.

Near the coasts.

Var. *gracilis*, Fischer. Stems very slender, puberulous; leaves sometimes longer than the stems; 2 of the bracts like the leaves, up to 3 in. long; umbels sometimes lax.

Mundanthorai (Barber); Travancore (Bourdillon); loc. ? (Wight).

10. *Scirpus*, Linn.

Herbs; quite glabrous or the inflorescence slightly hairy. *Rhizome* 0 or creeping. *Leaves* narrow, arising from the base of the stem or from up to $\frac{2}{3}$ of its height, in submerged species from all along the stem, sometimes altogether absent. *Inflorescence* terminal or lateral of 1 to very many spikelets in clusters or umbels or corymbs. *Spikelets* usually many-flowered. *Glumes* spirally imbricate, rarely subdistichous below, 1—3 lowest empty, uppermost few tabescent, the intermediate

1—many with hermaphrodite flowers. *Hypogynous bristles* 0—7 (rarely 8 or 9), usually linear, sometimes broad, retrorsely scabrid, rarely plumose. *Stamens* 1—3, anterior. *Style* 2—3-fid, glabrous, base linear or conic and continuous with the nut. *Nut* sessile or nearly so, obovoid or oblong, trigonous with 3, biconvex with 2 stigmas, apex obtuse or acute, without apical button.

Leaves arising from $\frac{1}{2}$ the height of the stem or higher:—

Stems flaccid, slender, 1·5—12 in. long; leaves filiform, usually numerous, often clothing most of the stem, ·5—2·2 in. long; bracts 0; spikelets solitary, terminal, ovate, ·15—2 in. long; glumes ovate, concave, obtuse, purplish-brown, midrib and margins green, ·08—·09 in. long; bristles 0; style 2-fid; nut obovoid, biconvex, apiculate, almost stalked, ·05 in. long, pale, smooth.....1. *fluitans*.
Stems rigid, erect, trigonous; spikelets 2-many (rarely single) in umbels or corymbs; style 3-fid; nut obovoid, trigonous:—

Glumes broadly ovate, membranous, apex bifid, keel strong and produced into a straight or recurved awn, glabrous or puberulous, brown or golden-brown, ·15—·25 in. long, awn ·05—1 in. long. Rhizome creeping, bearing tubers; stem moderately strong, 1—6 ft. high; leaves often as long, coriaceous, ·15—2 in. wide (wider in tall plants); bracts 3—5 up to 6 in. long; spikelets usually many in a simple or compound umbel, clustered, sometimes reduced to a single spikelet, ovoid or cylindric, ·4—1·7 in. long; bristles 3—6, usually shorter than the nut; nut acute, dark olive-brown, smooth, shining, ·07—12 in. long

2. *maritimus*.

Glumes ovate-oblong, chartaceous, apex entire, obtuse, apiculate, not awned, strongly keeled, dark-brown, glabrous or puberulous, ·1—14 in. long. Rootstock stout, sometimes stoloniferous; stem stout, spongy below, sharply trigonous or 3-winged above, 4—10 ft. high; leaves $\frac{1}{2}$ — $\frac{3}{4}$ as long, up to 1 in. wide; bracts 3, up to 40 in. long and ·5 in. wide; spikelets in large, compound corymbs, solitary on slender, scabrid peduncles, ovoid, ·15—3 in. long; bristles 5—6, sparsely retrorsely hispid, shorter or longer than the nut; nut ·7 in. long with a conical apex, brown, smooth.....3. *grossus*.

Leaves radical or reduced to sheaths:—

Spikelets solitary or in simple clusters (1—2 rays sometimes added in 4, *supinus*):—

Spikelets lateral on the stem:—

Glumes not awned; bracts 0:—

Spikelets clustered; leaves reduced to sheaths:—

Inflorescence borne above the middle of the stem:—

Stems slender, terete:—

Glumes ovate-cymbiform, acute, strongly keeled, usually shortly mucronate, green, margins usually pale-brown, ·08—1 in. long. Stems 3—18 in. high; sheaths sometimes with a very short, erect blade; spikelets 3—12 in sessile clusters, sometimes 1—2 rays added, borne well below the apex of the stem; bristles 0; style 3-fid; nut globosely obovoid, trigonous, ·04—·05 in. long, black, transversely undulate-rugose.....4. *supinus*.

Glumes suborbicular-ovate, acute, keel not prominent, sometimes shortly mucronate, pale-brown, ·12—·14 in. long. Stems flaccid or rigid, 8—33 in. high; sheaths with an oblique, usually shortly cuspidate mouth; spikelets sessile, 2—5 (rarely solitary), in a cluster borne well below the apex of the stem; bristles 5—6, retrorsely hispid, shorter or longer than the nut; style 2-fid; nut broadly obovoid or subcircular, biconvex, apiculate, slightly narrowed at the base, brown or nearly black, ·09—1 in. long, faintly transversely lincolate.....5. *erectus*.

Stems robust, sharply triquetrous or almost 3-winged, 1—6·5 ft. high. Rootstock short with fibrous rootlets or with a stout horizontal rhizome up to 6 in. long; sheaths with oblique rounded mouth; spikelets few to many in a cluster ·5—2 in. below the acute apex of the stem, ovate or subcylindric, ·4—9 in. long; glumes broadly ovate, acute, often apiculate, keel inconspicuous, ·14—18 in. long, pale to reddish-

brown; bristles 5—8, retrorsely hispid, longer or shorter than the nut; style 3-fid, puberulous; nut broadly obovate, apiculate, biconvex, plano-convex or subtrigonus, dark olive-brown, faintly transversely striate and finely vertically lineolate, .08 in. long.....6. *mucronatus*. Inflorescence below the middle of the terete, transversely septate stem, septae visible externally; bristles 0; style 3-fid:—

Stems usually robust, spongy, .5—5 ft. high, over .1 in. diam., usually much more; sheaths lax, mouth oblique and often open; spikelets sessile, few to many in a dense lateral head often arising some distance above the mouth of the sheath, ovoid to cylindric-oblong, .2—75 in. long; glumes broadly ovate, very concave, narrowed, apex acute or subacute, often apiculate, hardly keeled, .17—23 in. long; nut broadly or narrowly obovate, sharply trigonous, apex shortly conical and apiculate, 2 or all 3 sides concave, black, smooth or with 16—20 more or less pronounced transverse wavy lines, .07—09 in. long

7. *articulatus*.

Stems slender, 3—12 in. high, .06 in. diam. or less; sheaths close, mouth oblique; spikelets sessile, few to many in a dense lateral head arising immediately above the mouth of the sheath, ovoid, .15—25 in. long; glumes suborbicular, slightly concave, not keeled, apex rounded, sometimes minutely apiculate, .1—12 in. long and slightly wider, pale-brown; nut obovoid, apex not narrowed, apiculate, obtusely trigonous with a vertical ridge along each angle, sides convex with 8—10 strong transverse undulate ridges, black, .05 in. long.....8. *Jacobi*.

Spikelets solitary, at right angles to the stem and near its apex, oblong, .06—09 in. long. Stems capillary, 1—6 in. high; leaves few, capillary .25—1 in. long; glumes obovate rhomboid, obtuse, densely imbricate, .025 in. long, reddish brown; bristles 0, replaced by 1—2 obovate, hyaline scales as long as the nut; stamen 1; style very shortly 2 fid; nut very narrowly obovoid, biconvex, fuscous, minutely muricate, slightly shorter than the glume.....9. *Isolepis*.

Glumes obovate-rhomboid, .025 in. long, acute, produced into a curved awn longer than itself, reddish-brown, awn brown. Stems filiform, 1—10 in. high; leaves shorter, filiform; bracts 0 or solitary, filiform, up to .5 in. long; spikelets 2—7 (sometimes 1) sessile, in a lateral head .5—2 in. below the apex of the stem, subglobose or ovate, .1—2 in. long; bristles 0; style, minute, 3-fid; nut narrowly obovoid-oblong, trigonous, .02 in. long, brown to black.....10. *squarrosus*.

Spikelets terminal, sessile, 2—6 in a cluster, rarely solitary, narrowly lanceolate, .3—5 in. long. Rhizome short, woody; stem rigid, terete, 2—32 in. high; leaves reduced to short sheaths, mouth oblique with a short cusp or sometimes a blade up to 1 in. long; bract 1, lanceolate, shorter than the spikelets; glumes narrowly ovate, acute, keeled, .18—23 in. long, pale-brown; bristles 5—6, brown, smooth, much longer than the nut; style 3-fid, puberulous; nut narrowly ellipsoid, narrowed at both ends, base of style falling late, sharply trigonous, smooth, brown, .07 in. long.....11. *subcapitatus*.

Spikelets corymbose; umbel lateral; bracts 0:—

Spikelets sessile, 3—many clustered at the ends of the rays, ellipsoid, .2—35 in. long. Rhizome horizontal, 2—4 in. long; stems stout, terete, 2—6 ft. high; leaves reduced to sheaths with a very oblique, cuspidate mouth; rays 3—14, sometimes a few again umbelled, flat, margins smooth, 0—3 in. long; glumes ovate, acute, .15—18 in. long, pale- or rusty-brown, acute, keel strong, produced into a mucro; bristles 0; style 3-fid; nut narrowly obovate, trigonous, apex narrowed, yellow, smooth, .08 in. long.....12. *corymbosus*.

Spikelets seldom, sessile, solitary, oblong-cylindric, .4—7 in. long. Stem stout, trigonous upwards, 2—6 ft. high; leaves grass-like and up to 24 in. long or reduced to sheaths; rays 4—12, some again umbelled, 0—3 in. long, flat, margins scabrid; glumes elliptic-oblong, .12 in. long, apex notched, keel produced into a cusp, red-brown, margins scarious; bristles 2—7, longer than the nut, red-brown, terete or flat, plumose; style 2-fid; nut obovate, bi- or plano-convex, apiculate, dark brown, smooth, .08 in. long.....13. *litoralis*.

1. *SCIRPUS FLUITANS*, Linn.; F. B. I. vi. 653.
Nilgiri and Pulney Hills; 6,500—8,000 ft.
2. *SCIRPUS MARITIMUS*, Linn.; F. B. I. vi. 658.
Mysore, Nellore. Usually near water.
Var. *affinis*, C. B. Clarke; F. B. I. vi. 659. Spikelets 1, or 2—5 clustered in a head, ovoid-lanceolate, 5—7 in. long; glumes pale straw-coloured with paler margins, 27 in. long.
Malabar
3. *SCIRPUS GROSSUS*, Linn.; F. B. I. vi. 659.
Carnatic. In still or running water.
4. *SCIRPUS SUPINUS*, Linn.; F. B. I. vi. 655.
In all Districts; sea-level to 4,000 ft. Often in rice-fields.
5. *SCIRPUS ERECTUS*, Poir.; F. B. I. vi. 656
Nilgiri and Pulney Hills; N. Coimbatore; N. Arcot; up to 6,500 ft.
6. *SCIRPUS MUCRONATUS*, Linn.; F. B. I. vi. 657.
W. Gháts from Mysore to Travancore; 3,000—8,000 ft. Vern. Kan. Hommagali Hullu.
7. *SCIRPUS ARTICULATUS*, Linn.; F. B. I. vi. 656.
In most Districts, especially near the coast; Mysore; sea-level to 3,000 ft. In tanks and marshy places.
8. *SCIRPUS JACOB*, Fischer in Kew Bull. 1931, 103.
Nellore District at Gudur (Jacob); "Pulicat Hills"? Kambakkam (Heyne); Coimbatore District at Virumandampalayam, 700 ft. (Fischer). Often growing with the last species and confused with it.
9. *SCIRPUS ISOLEPIS*, Boeck.; F. B. I. vi. 663.
Mysore (Cameron). Vern. Kan. Sanna Gundu Hullu.
10. *SCIRPUS SQUARROSUS*, Linn.; F. B. I. vi. 663.
In all Districts from Mysore southwards; sea-level to 2,000 ft. Vern. Kan. Kadu Vusamani Hullu.
11. *SCIRPUS SUBCAPITATUS*, Thw.; F. B. I. vi. 661.
Nilgiri and Pulney Hills; 6,000—8,000 ft.
12. *SCIRPUS CORYMBOSUS*, Heyne; F. B. I. vi. 657.
Mysore (Meebold); 2,000—3,000 ft.
13. *SCIRPUS LITORALIS*, Schrad.; F. B. I. vi. 659.
Cuddapah, Kurnool and Chingleput Districts; Travancore; sea-level to 2,000 ft.

11. *Fuirena*, Rottb.

Herbs, usually erect with creeping rhizome or fibrous roots. *Stem* leafy to above the middle or to the top. *Leaves* grass-like with an annular membrane at the mouth of the sheath. *Spikelets* in dense terminal and axillary clusters, many-flowered. *Glumes* spirally imbricate, strongly awned from the back a little below the apex, setose or puberulous at least in the upper half of the back, lowest 1—2 empty, uppermost few tabescent, intermediate bisexual, falling off gradually from the base upwards from the persistent rhachilla. *Hypogynous bristles* 2-seriate, rarely 1-seriate, sometimes 0; the 3 outer opposite the angles of the nut, usually short, linear, the 3 inner opposite the faces of the nut, linear, quadrate, obovate or partite, clawed, usually strongly

3-ribbed. *Stamens* 2—3. *Style* as long as or longer than the nut and continuous with it; stigmas 3, linear, usually long and puberulous. *Nut* ovoid or obovoid, trigonous, apex acute or conical, base more or less stipitate, exterior cells sometimes trabeculate.

Glumes 3-ribbed, not rigid, flat or slightly concave:—

Bristles all setiform or 0; leaves strongly 1-ribbed:—

Nut obovate, bluntly trigonous, .06 in. long, apex pyramidal, testa parchment-like, white, smooth, slightly creased, exterior cells minute, hexagonal. Rhizome short; stem triangular, more or less densely white-pubescent at the apex, up to 3.5 ft. high; leaves rigid, narrowly linear-lanceolate, acuminate, 1.5—8.5 in. long, margins recurved and scabrid, glabrous or more or less pubescent, especially the uppermost one; rhachis of inflorescence white-pilose, bracts linear-lanceolate, white-pilose, up to 1.5 in. long; spikelets sessile, 2—10 in corymbose clusters, ellipsoid, .3—5 in. long; glumes broadly elliptic-oblong, slightly concave, .13—17 in. long, .08—1 in. wide, awn .07—15 in. long, dorsal surface and awn grey hispid or puberulous, when dry pale-brown or fuscous with reddish streaks in the lower $\frac{2}{3}$, apex and awn green, bristles 0

1. *pubescens* var. *pergamentacea*.

Nut broadly obovate or suborbicular, sharply trigonous, .05 in. long, apex conical, shortly stalked, straw-coloured, the angles often dark and erose, faces with 3—5 slender vertical lines, the exterior cells transversely oblong and trabeculate. Rhizome often long, woody; stems up to 5 ft. high, sharply trigonous, slightly pubescent near the apex; leaves and spikelets as in the last species; rhachis of inflorescence glabrous or puberulous; glumes oblong, .1—14 in. long, .06—08 in. wide, awn .06 in. long, dorsal surface and awn grey-puberulous, when dry fuscous or reddish in the lower $\frac{2}{3}$, apex and awn greenish; bristles 0, 3 or 6; when 6, 3 outer very short, 3 inner shorter or longer than the nut, hispid.....2. *Wallichiana*.

Bristles 3 or 6, the 3 inner broad and flat; leaves 3—5-ribbed:—

Rhizome 0; stems slender, up to 16 in. high, striate glabrous below, patently hairy above; leaves linear-lanceolate, acuminate, 1—5 in. long, up to .3 in. wide, usually patently hairy as are the sheaths; spikelets ovoid or oblong, .2—4 in. long; glumes obovate or oblong, rounded, .06—1 in. long, awn .05—06 in. long, the upper half on the back and the awn puberulous, the awn and often the midrib setose, fuscous-brown, awn paler; bristles 6, 3 outer short, setiform, hispidulous, 3 inner quadrate, strongly 3-ribbed or almost 3-keeled, .05 in. long including a straight claw nearly as long as the blade, apex apiculate, outer angles acute or shortly apiculate, basal angles slightly hastate; nut narrowly or broadly obovoid, cuspidate, shortly stalked, .04—05 in. long, sharply trigonous, whitish, smooth or faintly transversely lineolate

3. *glomerata*.

Rhizome creeping, woody; stem rather robust, up to 4 ft. high, strongly striate or ribbed, glabrous or nearly so; leaves linear-lanceolate, acuminate, up to 9 in. long and .65 in. wide, glabrous or more or less pubescent; rhachis of inflorescence densely, softly pilose; spikelets narrowly oblong, .2—3 in. long; glumes obovate-oblong, .09—11 in. long, awn .04—06 in. long, fuscous-brown, the upper half on the back and the awn hispid, the awn sometimes setose; bristles 3 or 6, 3 outer when present short and setiform, 3 inner .05—06 in. long, obovate-oblong with a claw much shorter than the blade and so much S-shaped that the blade appears sessile, apiculate, 3-nerved, glabrous or minutely puberulous; nut broadly obovate, sharply trigonous, acuminate, shortly stalked, .04 in. long, pale- or chestnut-brown, smooth or slightly rugulose.....4. *umbellata*.

Glumes rigid, 7-ribbed, the 2 outer ribs vanishing about the middle, the rest converging into the stiff, usually curved awn, obovate, cymbiform with flat, ciliate margins, .08—11 in. long, awn, .04—06 in. long, keel and awn puberulous or hispidulous. Rhizome 0; stems 1—12 in. high, glabrous below, more or less pubescent above; leaves linear, acuminate, 3—5-ribbed, up to 4 in. long and .2 in. wide, laxly hairy as are the sheaths; spikelets crowded in capitate, simple or lobed clusters, ovoid, .15—2 in. long; bristles 6, 3 outer short, setiform, sparsely retrorsely hispid, 3 inner quadrate or suborbicular with a short straight claw, 3-ribbed, .04—05 in. long, apex 3-toothed, the middle tooth longest, with a

short filiform awn from the back near the apex; nut obovoid, sharply trigonous, acuminate, shortly stalked, .033 in. long, pale-brown or almost white, smooth

5. *uncinata*.

1. *FUIRENA PUBESCENS*, Kunth, var. *PERGAMENTACEA*, Fischer, var. nov.
Pulney Hills (Bourne 3097 type, 1207, 3096; Anglade 2164 at Palamalai 1782).
2. *FUIRENA WALLICHIANA*, Kunth; F. B. I. vi. 665.
N. Coimbatore Hills (Fischer at 4,000 ft., Jacob).
3. *FUIRENA GLOMERATA*, Lam.; F. B. I. vi. 666.
In most Districts; sea-level to 3,500 ft. Vern. *Kan. Petlu Góri Hullu*.
4. *FUIRENA UMBELLATA*, Rottb.; F. B. I. vi. 666.
Ganjam Agency (Barber); S. Kanara, Malabar, Cochin and Travancore; near sea-level to 2,600 ft. In swamps.
5. *FUIRENA UNCINATA*, Kunth; F. B. I. vi. 666.
E. Districts from Ganjam to Chingleput, Salem and Coimbatore; sea-level to 2,000 ft.

12. *Lipocarpa*, R. Brown.

Glabrous herbs; rhizome 0 or short. *Stems* tufted, obtusely triangular. *Leaves* grass-like, from the base of the stem only. *Spikelets* 1—20 in a single terminal bracteate head, many-flowered. *Glumes* spirally imbricate, 1—2 lowest empty, uppermost few tabescent, intervening bisexual, falling away successively from the base of the persistent rhachilla. *Hypogynous bristles* replaced by 2 subequal opposite hyaline scales more or less adherent to the nut. *Stamens* 1—3, usually 2. *Style* short, slender, stigmas 2, sometimes 3. *Nut* sessile, plano-convex or trigonous, obovoid or linear-oblong, smooth, usually minutely punctate.

Glumes pale or fuscous, sides hyaline and usually dotted and streaked with red-brown, spatulate-oblancoate, apex triangular, acute, .1—1.3 in. long. Rhizome 0 or short, vertical; stems rigid, 3—26 in. high; leaves as long in small plants, up to 9 in. long, rigid; bracts usually 3, rigid, unequal, .5—4.5 in. long, base broad; spikelets broadly ovoid, aggregated in heads of 3—10, rarely 1—2, .25—4 in. long; scales narrowly lanceolate, nearly as long as the glumes, longitudinally veined, readily splitting into linear segments, nut narrowly obovate-oblong, plano-convex or biconvex, brown, .04—0.5 in. long.....1. *argentea*. Glumes dark-purple or purple-spotted, cuneate-obovate, suddenly acute, .07 in. long. Rhizome 0; spikelets ovoid, 1—8, commonly 3 aggregated in a bed, .15—2.5 in. long; scales lanceolate, acute or obtuse, nearly as long as the glume; nut narrowly oblong, brown, nearly as long as the scales, very similar otherwise to the last species but smaller and more slender and with flaccid leaves and bracts.

2. *triceps*.

1. *LIPOCARPHA ARGENTEA*, R. Br.; F. B. I. vi. 667.
Mysore, Wynaad, Nilgiri and Pulney Hills; 3,000—7,000 ft. Often confused with *Kyllinga triceps*, Rottb.
2. *LIPOCARPHA TRICEPS*, Nees. *L. sphacelata*, Kunth; F. B. I. vi. 667.
Ganjam District (Gamble), Mysore, Salem District, Carnatic; sea-level to 3,000 ft.

13. *Rynchospora*, Vahl.

Erect herbs; rhizome 0 or woody and short or long, roots fibrous. *Leaves* grass-like, either from the base only or from nodes all along

the stem. *Spikelets* solitary or fascicled, in single or corymbose bracteate heads or in panicles, terminal or axillary added, 1–9-flowered, rarely many-flowered. *Glumes* imbricate all round the rhachilla, lower sometimes more or less distichous, lowest 3–4, sometimes more, smaller and empty, usually enlarging upwards, uppermost few narrow, empty or ♂, intervening bisexual. *Hypogynous bristles* 0–6, sometimes 7–8, when present setiform, often scabrid or plumose. *Stamens* 1–3, rarely 6. *Style* long or short, base dilated; stigmas 2, very short or long. *Nut* ovoid, oblong or subglobose, biconvex or nearly flat, beaked by the persistent, sometimes elongate style-base, sessile or shortly stalked, smooth or transversely undulate.

Leaves from near the base of the stem only; spikelets aggregated in a single globose head, .3–.4 in. diam., lanceolate, acute; glumes 7–8, floral ovate-lanceolate, acuminate, .19–.26 in. long; style long, stigmas very short:—

Nut broadly obovoid, turgidly biconvex, .07–.09 in. long, including a triangular beak $\frac{1}{2}$ – $\frac{1}{3}$ as long and a distinct stalk, black when ripe, smooth, the upper part sometimes minutely scabrid. Stem slender, 6–27 in. high; leaves narrowly linear, acute, flat or complicate, 2–16 in. long; bracts 3–8, unequal, nearly always longer than the head, up to 2.2 in. long, margins and midrib below pilose-ciliate; glumes shining, fuscous- or yellowish-brown; bristles usually 6, sometimes 0, much shorter than the nut, ascendingly hispidulous

1. *Wallichiana*.

Nut narrowly oblong, much compressed, sides nearly flat, .1–.16 in. long, including the narrowly triangular beak and short stalk, .03 in. wide, dark-brown or black, the faces covered with white or pale papillae. Stem, leaves and bracts as in the last species; glumes usually narrower and paler; bristles 5–6, much longer than the nut, sometimes twice as long; style very slender

2. *Wightiana*.

Leaves from nodes throughout the stem; spikelets paniculate or corymbose:—

Stems robust, sharply triangular, 2–5 ft. high; leaves up to 2 ft. long, .5–1 in. wide, acuminate, margins and midrib below scabrid; spikelets narrowly subulate, .2–.5 in. long, numerous in corymbose panicles up to a foot long; bracts like the leaves, often longer than the inflorescence; glumes 6–7, pale-brown, keeled, floral ovate, concave, mucronate or cuspidate, up to .28 in. long; bristles 6, sometimes fewer, about as long as the nut; nut obovoid, truncate, thick, sessile, without the beak about .13 in. long, greyish-brown, the sides somewhat undulate or excavate; faces flattish, punctate, beak elongate-conical from a base as broad as the nut, and as long as or longer than it, up to .25 in. long, acuminate, the faces channelled; style very shortly 2-fid.....3. *corymbosa*.

Stems slender, nearly terete; up to 2 ft. high; leaves very narrow; style-branches long; nut turgidly biconvex:—

Leaves setaceous, 4–12 in. long, smooth; bracts usually very short; spikelets few in lax panicles, solitary on long capillary pedicels, linear-lanceolate, .2–.3 in. long, often bearing 2 nuts; glumes ovate-oblong, .12–.19 in. long, mucous or mucronate, brown with darker dots; bristles 0; nut quadrately obovoid-globose, .07 in. long including the short, broad, basally emarginate beak, ashy, faces with 4–5 strong transverse wavy ridges.....4. *gracillima*.

Leaves flat, sometimes channelled, midrib strong, margins often scaberulous, 3–20 in. long, up to .15 in. wide; bracts usually shorter than the panicles; spikelets few in terminal or corymbose panicles, shortly pedicelled or somewhat clustered, ellipsoid, .15 in. long, often bearing 3 nuts with an empty glume between the 2 upper ones; glumes rotund-ovate, keeled, cuspidate, fuscous-brown, the floral .14–.18 in. long; bristles 5–6, about as long as the nut, not overtopping the beak, ascendingly hispidulous; nut broadly obovate or suborbicular, truncate, .1–.12 in. long including the triangular beak, brown with darker dots in wavy transverse lines or concolorous and faintly transversely undulate-lineate; basal margins of the beak truncate or with a short rounded projection

5. *glauca*.

1. *RYNCHOSPORA WALLICHIANA*, Kunth; F. B. I. vi. 668.
Travancore, in backwaters at Ambalapuzha (K. Rangachari).
2. *RYNCHOSPORA WIGHTIANA*, Steud; F. B. I. vi. 669.
Mysore and W. Coast; sea-level to 3,000 ft.
3. *RYNCHOSPORA CORYMBOSA*, Dom. *R. aurea*, Vahl; F. B. I. vi. 670.
W. Coast and hills; Kollimalai and Sirumalai Hills; sea-level to 2,000 ft. in marshes.
4. *RYNCHOSPORA GRACILLIMA*, C. B. Clarke; F. B. I. vi. 671.
Tinnevely Hills (Beddome).
5. *RYNCHOSPORA GLAUCA*, Vahl; F. B. I. vi. 671.
Nilgiri, Anamalai (Beddome), Pulney and High Wavy (Blatter and Hallberg) Mountains; 5,500—7,500 ft.

14. *Remirea*, Aublet.

Creeping, branched, rigid, glabrous, perennial herbs; rhizome long. *Stems* erect, short, leafy throughout. *Spikelets* in a crowded terminal, solitary or digitate head, 1-flowered. *Glumes* 4, laxly imbricate on all sides, 3 lowest empty, increasing in size upwards, 4th containing a pseudo-terminal bisexual flower. *Hypogynous bristles* 0. *Stamens* 3. *Style* not dilated at the base; stigmas 3, linear. *Nut* linear-oblong or ellipsoid, trigonous, smooth, closely embraced by the floral and the 3rd glumes.

REMIREA MARITIMA, Aubl.; F. B. I. vi. 677.

S. Kanara and Malabar Districts, on the coastal sands.

Rhizome sometimes several feet long, rooting at the nodes and producing erect stems up to 6 in. high; leaves closely spirally imbricate, rigid, linear, channelled, 1—3 in. long, apex triquetrous, pungent; bracts 2—6, like the leaves; spikes ellipsoid, .25—5 in. long; spikelets ellipsoid, .16 in. long; glumes brown, 3 empty coriaceous, ovate, ribbed, floral oblong, very thick, corky, .125 in. long, with a deep groove in which the nut lies; nut linear-oblong, often curved, very shortly beaked, .1 in. long, black, minutely punctate.

15. *Hypolytrum*, L. C. Rich.

Robust, perennial herbs; rootstock woody, stolons long, hardening into rhizomes. *Stems* erect, trigonous, leafy to above the middle. *Leaves* grass-like, linear-ensiform, 3-ribbed. *Bract* long or short. *Spikes* in subumbellate panicles with spreading branches or contracted into a lobed head, ellipsoid or subglobose. *Spikelets* imbricate all round the rachis, 3-flowered, the 2 basal ♂ with each a single stamen and a terminal naked ♀ flower between. *Glumes* 3—7, basal empty, next 2 opposite, membranous or hyaline, each containing a solitary stamen, 0—4 empty glumes intercalated between the ♂ and ♀ flowers. *Bristles* 0. *Style* continuous with the ovary, persistent; stigmas 2, long. *Nut* ovoid or fusiform, turgidly biconvex, often nearly terete, bony, with a more or less conspicuous beak, smooth or rugose.

HYPOLYTRUM LATIFOLIUM, L. C. Rich.; F. B. I. vi. 678. *H. Wightianum*, Boeck.; F. B. I. vi. 678.

W. Coast and Ghâts; 500—3,000 ft.

Stem 2—3 ft. high, trigonous; leaves sometimes longer, acuminate, base narrowed, .5—8 in. wide, margins and midrib below spinulose, especially near the apex; bracts like the leaves, up to 17 in. long; spikes sessile or pedunculate in compound corymbose or contracted panicles, oblong-cylindric in flower, subglobose and lobed in fruit, .2—2.5 in. long; empty glume brown with darker dots, oblong or obovate, rounded or subacute, .07—1.2 in. long, slightly concave, keeled, rigid, ♂ glumes complicate, narrowly boat-shaped or oblanceolate, acute or subacute, .05—1.2 in. long, membranous or hyaline, keel brownish and more or less ciliate, appressed to the ripe nut; intercalated glumes 0; nut either fusiform and acuminate, or broadly ovoid, acute or cuspidate, base narrowed or rounded, turgidly biconvex or nearly terete, .1—1.4 in. long, including the inconspicuous or large and patent sometimes swollen beak which is often longer than the nut itself and as broad or broader, often pale and speckled with brown; nut brown, smooth or rugose, sometimes empty.

16. *Lepironia*, L. C. Rich.

Erect, leafless herb; rhizome horizontal, woody, clothed in scales. *Stems* tufted, terete, transversely septate, septae visible from without when dry, sheathed at the base. *Spike* solitary, lateral near the apex of the stem, sessile. *Bracts* 0. *Spikelets* imbricate all round, 4—10-flowered, 2 basal and 2—8 above ♂ with a single stamen, the terminal a naked ♀. *Glumes* 9—25, lowest empty, rigid, concave, containing the rest, next two opposite, complicate, boat-shaped, each with 1 stamen, 6—21 following with a single stamen or empty, a few narrowly boat-shaped, the others flat, at least 3 or 4 below the terminal empty. *Style* long, continuous with the beak of the ovary; stigmas 3. *Nut* large, bony, broadly ellipsoid, much compressed, ribbed or smooth.

LEPIRONIA ARTICULATA, Dom. *L. mucronata*, L. C. Rich.; F. B. I. vi. 684.

Vicinity of Tranquebar (Koenig). Perhaps only cultivated or a casual escape. Used in Java for mat-making.

Stems up to 36 in. high and .15 in. diam.; sheaths 2—3, striate, up to 8 in. long, mouth oblique, acute; spike ellipsoid, acute, up to .8 in. long, arising .75—2 in. below the finely acuminate tip of the stem; spikelets numerous; rhachilla stout, persistent, lobed by the lenticular scars of fallen spikelets; lowest glume suborbicular, obtuse, .2—2.5 in. long, brown with darker streaks, margins very narrowly hyaline, next two glumes opposite, complicate, narrowly boat-shaped, about .2 in. long, hyaline, keel curved, brown and ciliate, containing a single stamen, the next 6—21 more or less whorled, very narrowly boat-shaped or flat, acute, about .19 in. long, usually hyaline with brown midrib, about 5 containing a single stamen, the rest empty; staminal filaments long, flat; anthers linear about .08 in. long with a sub-

late dark beak $\frac{1}{4}$ as long; nut obovoid, biconvex with one side more turgid than the other, .15—.16 in. long, beak narrow, truncate, brown, smooth or more or less ribbed.

17. *Scleria*, Berg.

Erect herbs with fibrous roots or woody rhizomes. *Stems* usually triquetrous, leafy throughout. *Inflorescence* of copious or restricted panicles or reduced to apparently simple spikes. *Bracts* leaf-like, often setaceous-caudate; bracteoles usually filiform. *Spikelets* fasciated or solitary, androgynous or unisexual, narrow in flower, the ♀ usually shorter and broader. *Glumes* many, imbricate all round; in ♂ or ♀ spikelets 1—4 lowest subdistichous, empty, the next empty or containing a ♀ flower, the following several narrower, not keeled, convolute, containing linear hyaline scales and 1—3 stamens, uppermost tabescent; in ♀ spikelets 2—3 lower glumes empty, the next containing a ♀ flower, the upper glumes empty. *Anthers* often cuspidate. *Disc* below the ovary annular, rarely obscure or 0, often enlarged and cupular or 3—6-lobed. *Style* slender; stigmas 3. *Nut* ovoid, oblong or globose, often obtusely trigonous, very often white and polished like marble, smooth or variously sculptured.

Annuals, rhizome 0 or very small:—

Panicle sparingly branched, glabrous; disc 3-lobed, lobes small, oblong or subquadrate, truncate, rounded or acute; nut subglobose or globose-oblong, often minutely apiculate, .1—12 in. long, white or pale-grey, tessellately longitudinally reticulate. Stems rather slender, 3—36 in. high; leaves up to 12 in. long and .2 in. wide; spikelets few, clustered, .2—25 in. long.....1. *tessellata*. Spikelets few, .2—26 in. long, clustered in a single terminal, peduncled head, peduncle and head hairy; disc small, reflexed, entire or nearly so; nut globose above a rather stout, 6-ribbed, glabrous base, .06 in. diam., whitish or pale-brown, covered with white-pubescent tubercles. Stems slender, 4—12 in. high; leaves as long or shorter, very narrow; glumes setose, villous, more or less cuspidate

2. *Neesii*.

Perennials with woody rhizome:—

Disc 0:—

Leaves .1 in. wide or less, as long as or shorter than the stem; sheaths hairy at least at the mouth. Rootstock hard, elongate, nodular; stems slender, up to 3 ft. high; bracts and bracteoles long, almost capillary; spikelets in small clusters on a filiform rhachis, .16 in. long; nut broadly ellipsoid, obtusely trigonous, .1 in. long, smooth (wrinkled in var. *Roxburghii*), white polished

3. *lithosperma*.

Leaves .5—1 in. wide, up to 3 ft. long; sheaths glabrous. Rootstock stout; stems robust, sharply trigonous, up to 8 ft. high; panicles large, branches trigonous, spreading; bracts like the leaves, bracteoles long, filiform from a dilated base; spikelets very many, clustered, .2 in. long; nut ellipsoid-ovate above a bluntly triangular base, acute, subacute or cuspidate, .12—.16 in. long, white, smooth, polished.....4. *corymbosa*.

Disc developed:—

Disc 3-lobed:—

Nuts smooth:—

Panicles with many capillary bracteoles; lobes of disc triangular, acute, $\frac{1}{4}$ —1 as long as the nut; nut globose or broadly ovoid, .1—12 in. long, white or brownish, minutely puberulous, smooth, polished, sometimes faintly transversely lineolate. Rootstock nodular; stems trigonous, up to 3 ft. high; leaves up to 20 in. long and .3 in. wide; sheaths often winged, mouth with a short, rounded, scarious, usually hairy ligule; panicles small, slender; spikelets solitary or clustered, .15 in. long.....5. *hebecarpa*.

Panicles with few or no capillary bracteoles; nuts glabrous:—

- Disc-lobes small, obtuse; nut nearly globose, apex slightly raised, .14 in. long, white, smooth, polished. Rootstock stout, stoloniferous; stems up to 3 ft. high, trigonous; leaves up to 4 ft. long, .5—1 in. wide; sheaths triquetrous, mouth truncate and with a narrow membrane; spikelets sessile, solitary, distantly spicate on the slender, angled, flexuose branches of a terminal, long-peduncled panicle, .15—16 in. long.....6. *poaeformis*. Disc-lobes broadly ovate or suborbicular, rounded, acute or acuminate; nut oblatly spherical, .1 in. long, .12 in. wide, white, smooth, polished. Stems up to 4 ft. high, rather stout, sharply trigonous; leaves up to 2 ft. long and .4 in. wide; sheaths trigonous, mouth truncate or with a very short, arched ligule; spikelets numerous, sessile or pedunculate, subsolitary on the stiff, straight, angled branches of terminal and axillary oblong panicles, .14 in. long.....7. *laevis*. Nuts reticulate, globose or broadly ellipsoid, obtuse or apiculate, .1—1.5 in. long, white, pale-brown or dark-, sometimes purplish-brown; disc-lobes short, rounded. Stems stout, sharply trigonous, angles scabrid, up to 6 ft. high; leaves up to 2 ft. long and .66 in. wide; sheaths sharply trigonous, those of the midstem often winged, mouth with a short, rounded, coriaceous ligule; spikelets sessile or peduncled, subsolitary in large, long-peduncled, decom-pound panicles, .14 in. long.....8. *cochinchinensis*. Disc cupular, crenate, $\frac{1}{2}$ — $\frac{3}{4}$ as long as the nut. Stem stout, trigonous, angles smooth or scaberulous, up to 8 ft. high; leaves up to 2 ft. long and .75 in. wide; sheaths not winged, mouth truncate; spikelets numerous, sessile or shortly peduncled, solitary on the branches of terminal and axillary oblong panicles, .17 in. long; bracteoles filiform; nut globose, .09—12 in. in diam., brown, closely, rugosely pitted.....9. *sumatrensis*.

1. *SCLERIA TESSELLATA*, Willd.; F. B. I. vi. 686.
Tada, Nellore District (Bourne); Mysore at 3,000 ft. (Meebold); Nilgiri Hills at Kaity (Hohenacker). In swampy situations.
2. *SCLERIA NEESII*, Kunth; F. B. I. vi. 688.
Yeddigarra, Malabar District.
3. *SCLERIA LITHOSPERMA*, Sw.; F. B. I. vi. 685.
In all Districts; sea-level to 4,000 ft.
Var. *Roxburghii*, Thw.; F. B. I. vi. 686. Rather larger; nut transversely wrinkled with ferruginous glands.
Ganjam and N. Coimbatore Districts (Fischer); Pulney Hills (Bourne); Travancore; Tinnevely District.
4. *SCLERIA CORYMBOSA*, Roxb.; F. B. I. vi. 686.
Rampa District at 2,000 ft. (Narayanswami); Godavary, Chingleput and Malabar Districts; Travancore.
5. *SCLERIA HEBECARPA*, Nees; F. B. I. vi. 689.
Rampa Hills at 2,500 ft. (Ramaswami, Narayanswami); W. Coast from sea-level to 2,500 ft.
Var. *pubescens*, C. B. Clarke; F. B. I. vi. 689. Leaves softly villous on both faces.
Travancore (Narayanswami).
6. *SCLERIA POAEFORMIS*, Retz. *S. oryzoides*, Presl.; F. B. I. vi. 691.
Without precise locality (Rottler Collection).
7. *SCLERIA LAEVIS*, Retz.; F. B. I. vi. 694.
Travancore at Karippanthode (Rama Rao).
8. *SCLERIA COCHINCHINENSIS*, Druce. *S. elata*, Thw.; F. B. I. vi. 690.
S. melanostoma, Boeck.; F. B. I. vi. 692.
Mahendragiri in the Ganjam District at 4,300 ft. (Fischer and Gage); Cuddapah forests (Beddome); Gersoppa Falls (Meebold);

Bababudan, Nilgiri, Anamalai, Shevaroy, Pulney, Travancore and Tinnevely Hills; 2,000—7,000 ft.

9. *SCLERIA SUMATRENSIS*, Retz.; F. B. I. vi. 693.
Travancore.

18. *Diplacrum*, R. Brown.

Small, tufted, glabrous, annual herbs. *Stems* leafy throughout. *Spikelets* very small in small, dense terminal and axillary clusters at the mouth of the leaf-sheaths, 1-sexual; ♂ 3—4 at the base, 1—2-flowered with about 3 glumes, stamens 1—2; ♀ terminal, 1-flowered with 2 opposite glumes. *Style* slender; stigmas 3. *Nut* globose or nearly so.

DIPLACRUM CARICINUM, R. Br. *Scleria caricina*, Benth.; F. B. I. vi. 688.

Kambakkam Hills in Chingleput District (Bourne); Mysore at 3,500 ft. (Meebold); S. Kanara and Malabar Districts; Quilon (Wight); near sea-level to 2,500 ft.

Stems slender, 1—14 in. high, clothed with the leaf-sheaths; leaves linear, flat, 5—3 in. long; bracts short, lanceolate, margins minutely scabrid; clusters of spikelets small; spikelets minute, ♂ 3—5 at the base, .05—06 in. long, glumes 3—4, membranous or hyaline, brownish, ♀ narrowly ovate, glumes 2 slightly united at the base and falling with the nut from the minute knobbed pedicel, coriaceous, ribbed, .07 in. long, 3-cuspidate, lobes acuminate, midlobe longest, lateral lobes and part of the margins sometimes hyaline; nut nearly globose, minutely apiculate, .05 in. long, whitish or pale-brown, strongly 15-ribbed, the ribs sometimes anastomosing.

19. *Ascopholis*, Fischer.

Erect, glabrous herbs; roots fibrous. *Stem* solitary, swollen at the base and clothed in fleshy scales, leafy near the base only. *Spikes* sessile, 3-several aggregated in a globose terminal bracteate head. *Spikelets* spirally imbricate, 1-flowered. *Rhachilla* disarticulating above the 2 empty glumes, leaving a knob. *Glumes* 2, opposite, lower empty, upper spatuliform containing a single hermaphrodite flower enclosed in a longer utricular scale which is split down one side about half-way. *Bristle* 0 or 1. *Stamens* 3. *Style* continuous with the ovary, base not enlarged; stigmas 2—3, filiform. *Nut* enclosed in the scale, oblong, sessile, plano-convex or subtrigonus.

ASCOPHOLIS GAMBLEI, Fischer in Kew Bull. 1931, 105.

Ootacamund at 7,000 ft. (Gamble).

Stem striate, 1.5—4 in. high; leaves shorter or longer, filiform or very narrowly linear; spikes oblong, about .4 in. long; bracts 4, linear from a broad base, .4—2.8 in. long; spikelets linear; glumes hyaline and brown-dotted, veined, .1—12 in. long; scale pale-brown often with darker dots, .14—15 in. long; bristle 0 or 1, capillary, white, much shorter than the ovary; nut narrowly oblong, plano-convex or subtrigonus, dark-brown, .1 in. long.

20. *Carex*, Linn.

Herbs, usually erect, with a perennial rhizome. *Stems* leafy mainly at the base. *Leaves* grass-like, the 2—3 lowest usually reduced to sheaths. *Inflorescence* of simple or paniced spikes, rarely reduced to 1 spikelet; flowers unisexual. *Spikelets* usually solitary, rarely all clustered, androgynous or unisexual, rarely dioecious; androgynous spikelets usually with the ♀ flowers below and few to many ♂ above; when unisexual usually 1—few terminal spikelets are ♂ with more numerous ♀ below; sometimes unisexual and androgynous spikelets occur on the same plant. *Glumes* usually numerous, imbricate all round the rachilla, persistent, 1—flowered or empty. *Stamens* 2—3. *Ovary* and nut completely enclosed in an entire or more or less deeply 2-toothed utricle; style slender, sometimes dilated at the base; stigmas 2—3, exserted from the utricle. *Nut* lenticular or trigonous.

Inflorescence spicate (sometimes a little paniculate at the base in 6. *longicruris*):—
Spikelet single, terminal, linear-oblong, .5—57 in. long, 5—6-flowered. Stems 2—3 in. high, base slightly swollen and enclosed in sheaths; leaves shorter, .12 in. wide; glumes broadly oblong, pale-ferruginous, obtuse, margins hyaline, two only with ♀ flowers; stigmas 3.....1. *Christii*.
Spikelets several:—

Spikelets androgynous, ovoid or oblong, more or less crowded in a compound spike; stigmas 2:—

Spike not or hardly interrupted, .5—1.1 in. long, ovate or oblong; bracteoles 1—3, elongate, filiform, up to 6 in. long, rarely all very short. Stem slender, 3—25 in. high; leaves usually shorter, sometimes longer, very narrow, canaliculate or margins involute; spikelets 8—14 in the spike, sometimes more, ovoid, .2—3 in. long; glumes ovate, cuspidate or awned, .15 in. long, pale-brown or ferruginous; utricle .17—2 in. long, lanceolate or ovate-lanceolate below, narrowed into a slender 2-fid beak, margins scaberulous.....2. *nubigena*.
Spike interrupted in the lower part, .9—4 in. long, linear; bracteoles very short, rarely one of them up to 2 in. long, filiform. Stems slender, 4—36 in. high; leaves usually shorter, rarely longer, flat, up to .25 in. wide; spikelets 6—14 or more, distant below, crowded towards the apex, narrowly or broadly ovate, .2—5 in. long; glumes ovate, acuminate, more or less aristate, .1—1.2 in. long, pale-brown; utricle .15 in. long, ovate or ovate-lanceolate below, narrowed into a slender 2-fid beak, margins scaberulous.....3. *foliosa*.

Spikelets linear or cylindric, often elongate, solitary or clustered:—

Utricles distinctly beaked:—

Utricles not tomentose:—

Stigmas 2; spikes androgynous, ♂ portion apical, short:—

♀ glumes ovate or ovate-lanceolate, glabrous, .21—26 in. long including an arista usually nearly as long as the blade, pale straw-coloured, keel and arista green. Stems slender, up to 38 in. high; leaves shorter or longer, 1—2 short ones from mid stem, flat, .1—25 in. wide; bracts very narrow, up to 9 in. long; spikelets solitary, 3—12, distant, on rather long slender peduncles, linear, .5—3 in. long; utricles .2—29 in. long, ellipsoid or ovate below, narrowed into a slender 2-fid beak minutely scabrid on the margins, many-ribbed, glabrous, straw-coloured or green 4. *longipes* var. *dissitiflora*.

♀ glumes not aristate, rarely cuspidate:—

Utricle .15—18 in. long, elliptic below, narrowed into a slender 2-fid beak, base narrowed, dark-brown or cinnamon-coloured, many-ribbed, hispid. Stems slender, up to 42 in. high; leaves usually shorter, .1—2 in. wide; bracteoles very slender, up to 2 in. long; spikelets 4—12, linear, sessile or shortly peduncled, .3—1.25 in. long; ♀ glumes oblong-ovate to lanceolate, obtuse, subacute or acuminate, brown, .1—16 in. long.....5. *brunnea*.

Utricle .13—17 in. long, elliptic-lanceolate below, narrowed into a

slender 2-fid beak scaberulous on the margins, base stipitate, pale-brown, many-ribbed, glabrous. Stems slender, up to 30 in. high; leaves shorter, .1 in. wide; bracteoles filiform up to 1.5 in. long; spikelets numerous, sometimes more or less panicle below, linear, .3—1 in. long; ♀ glumes ovate or oblong-lanceolate, obtuse or acuminate, rarely shortly cuspidate, reddish-brown, .09—16 in. long.

6. *longicruris*.

Stigmas 3:—

♀ glumes aristate or cuspidate:—

Spikelets androgynous:—

Spikelets ovate or ellipsoid, .25—4 in. long, few-flowered, clustered in a few distant short ovoid spikes. Stems slender, up to 3 ft. high; leaves shorter or longer, up to .15 in. wide; bracts longer than the inflorescence; ♀ glumes ovate or ovate-lanceolate, .17—19 in. long, including an arista often nearly as long as the blade, glabrous, striate, very pale-brown, margins often narrowly hyaline; utricles .2—26 in. long, broadly ovate below, narrowed into a 2-toothed beak nearly as long, many-nerved, very pale-brown

7. *leucantha*.

Spikelets numerous, narrowly linear, .7—2.5 in. long, many-flowered, pedicelled in distant clusters, ♂ often numerous. Stems rather stout, up to 3 ft. high; leaves about as long, .2—3 in. wide; bracts shorter than the inflorescence; ♀ glumes lanceolate or linear-oblong, .22—3 in. long including a distinct arista, bright chestnut or brown; utricles .2—24 in. long, narrowly fusiform below, narrowed into a slender 2-fid beak, few-ribbed, glabrous, beak and angles scabrid, olivaceous or ferruginous...8. *Walkeri*.

Spikelets unisexual, 3—5 close together on a radical scape, one terminal ♂, linear, lateral ♀ ovate or oblong:—

Utricles .09—1 in. long, obovate or broadly elliptic below, narrowed into a short, rather wide emarginate beak, many-ribbed, yellowish-green, pubescent, rarely glabrescent. Leaves longer than the peduncles, up to .08 in. wide; bracts longer than the inflorescence, upper filiform; peduncles 2.5 in. high; ♀ glumes obovate, .12—16 in. long including a long scabrid arista, pale straw-coloured, midrib green.....9. *breviculmis*.

Utricles .21—25 in. long, broadly elliptic below, gradually narrowed into a long, conical, deeply 2-fid beak, few to many-ribbed, pale-brown or olivaceous, glabrous. Leaves up to 20 in. long, .1—25 in. wide; bracts .5—1.7 in. long; peduncles slender, 4—11 in. high; ♀ glumes broadly ovate or ovate-lanceolate, .22 in. long including a long glabrous arista, pale-brown.....10. *Jackiana*.

♀ glumes broadly ovate or obovate, obtuse or subacute, .1—2 in. long, pale-brown or green, many-ribbed. Spikelets androgynous, linear, 1—2.5 in. long, ♂ portion apical slender, rather long, ♀ longer and wider, 1—3 on a radical slender scape up to 16 in. high; leaves longer, up to 25 in. long, .1—3 in. wide, flat above, often complicate below; utricles .16—24 in. long, ovate-elliptic and trigonous below, narrowed into a conical shortly 2-fid beak, the two interior margins narrowly winged and ciliate.....11. *speciosa*.

Utricles grey-tomentose, .16—17 in. long, ovate-elliptic below, narrowed into a slender or narrowly conical, deeply 2-fid beak nearly half as long, brown, not ribbed. Stems rather stout, trigonous, leafy to the top; leaves linear, up to 13 in. long, .25—4 in. wide, decreasing upwards into the bracts and downwards into reddish sheaths with or without a short blade, sheaths and upper surface and margins of blades scaberulous; spikelets unisexual, 4—9, solitary, distant, more or less peduncled, one terminal ♂, linear, .3—9 in. long, the rest ♀, cylindric, .4—1.7 in. long; ♀ glumes dense, ovate or oblong, .13—14 in. long, apex narrowed and obtuse with a short arista, ferruginous.....12. *hebecarpa*, var. *ligulata*.

Utricles not or very shortly beaked:—

♀ glumes with a long hispid awn, oblong or ovate, apex deeply emarginate, .1—14 in. long, including the awn, sides pale-brown, midrib and awn green.

Stems up to 40 in. long; leaves shorter or longer, up to 3 in. wide; bracts long, upper filiform; spikelets unisexual, 1 terminal ♂, rest ♀ with sometimes a few ♂ flowers at the tip, linear-cylindric, 1—3.6 in. long, solitary, pedicelled, often drooping; stigmas 2; utricles biconvex, ovate or trapezoid, acute, hardly beaked, usually very shortly stipitate, brown with pale angles, faces covered with white papillae which turn chocolate- or purplish-brown on drying.....13. *phacota*.

♀ glumes not awned:—

♂ spikelet 1, terminal, rest ♀; utricles longer than their glumes:—

Stigmas 2; utricles ovate, compressed, hardly beaked, mouth minutely emarginate, brown, 1 in. long, glabrous. Rhizome very small; stems slender, up to 15 in. high; leaves up to 4 in. long and 1 in. wide; bracts up to 4 in. long; spikelets 3—5, ♂ linear, 1—1.3 in. long, ♀ cylindric 1.6—1.6 in. long, sometimes with a few ♂ flowers at the apex; ♀ glumes oblong, rounded, sometimes apiculate, brown, midrib green, margins sometimes very narrowly hyaline, .08 in. long

14. *pseudo-aperta*.

Stigmas 3; utricles broadly ovoid, subtrigonal, not compressed, beak very short, mouth truncate, .09—1.1 in. long, dark cinnamomous- or purplish-brown when dry, papillose, faces strongly 3—5 nerved. Rhizome short, creeping; stems slender, up to 18 in. high; leaves shorter or longer, up to .35 in. wide; bracts up to 9 in. long; spikelets 3—5, ♂ linear, .5—1.4 in. long, ♀ sometimes with a few ♂ flowers at the apex, cylindric, .3—1.4 in. long; ♀ glumes ovate-oblong, obtuse, sometimes mucronulate, dark-brown, keel green, .06—0.08 in. long

15. *maculata*.

♂ spikelets 3, close together, terminal, linear, .4—7 in. long; ♀ several, distant on long, capillary peduncles, linear, 1—1.75 in. long. Stems slender, about 3 ft. high; bracts very narrow, not sheathing; ♀ glumes oblong, obtuse, .11—12 in. long, purplish-brown, midrib green, margins narrowly hyaline; stigmas 3, sometimes 2; utricles about equalling their glumes, elliptic below narrowed to the stipitate base and to a very short beak, dusky grey, 3—5-nerved, faces granulate.....16. *vicinalis*.

Inflorescence paniced; spikelets androgynous, ♂ portion apical:—

Spikelets 8 in. long or, usually, much less, ♂ portion very short; utricles narrow, beak long, slender:—

Partial panicles pyramidal, slender, expanded. Stems usually stout, up to 5 ft. high; leaves shorter or longer, up to .65 in. wide, widest in the middle, passing into the long sheathing bracts; bracteoles filiform; rhachis of inflorescence hispid; spikelets very numerous in decompound panicles, linear-oblong, .3—5 in. long; ♀ glumes ovate-lanceolate, acute or acuminate, .07—0.09 in. long, reddish-brown; utricles .12—1.6 in. long, narrowly ellipsoid or lanceolate below, narrowed into a very slender, long or short, usually bent beak with a rounded, rarely very shortly bifid mouth, olivaceous, ribbed.....17. *filicina*.

Partial panicles ovoid or oblong; mouth of utricles distinctly bifid:—

Rhachis of inflorescence glabrous, the angles more or less scabrid. Stem stout, up to 30 in. high; leaves often as long or longer, .2—5 in. wide; bracts narrow, up to 9 in. long; bracteoles few, very narrow, up to 3 in. long; spikelets suberect, narrowly linear when young, later oblong or ovate, .3—8 in. long; ♀ glumes ovate, .1—1.5 in. long including usually a short arista, straw-coloured or pale-brown; utricle .16—2.2 in. long, ellipsoid-trigonal below, narrowed into a long-straight beak, margins scabrous...18. *Wightiana*.

Rhachis of inflorescence more or less hairy or pubescent:—

Rhachis appressed pubescent; partial panicles usually contracted. Stems rather stout, up to 3 ft. high; leaves usually shorter, sometimes longer, up to .5 in. wide, minutely puberulous, upper sheaths puberulous at least at the mouth; bracts up to 8 in. long; bracteoles narrowly ensiform, scabrid-puberulous; spikelets crowded, oblong or linear-oblong, .3—4 in. long; ♀ glumes .1—1.8 in. long, lanceolate, usually scabrid-cuspidate or -aristate, reddish-brown, keel green; utricles .15—2.4 in. long, lanceolate or ellipsoid below, narrowed into a long slender beak with scabrid margins, obscurely ribbed.....19. *Lindleyana*.

Rhachis and peduncles shortly, rather densely, patent hairy; partial

panicles expanded. Stems rather stout, up to 30 in. high; leaves shorter, up to 3 in. wide, glabrous or minutely puberulous, uppermost sheaths sometimes puberulous at the mouth; bracts up to 8 in. long; bracteoles very slender, very short; spikelets usually at right angles to the rachis, oblong, 3—5 in. long; ♀ glumes narrowly ovate, .09—12 in. long, acute, cuspidate or rarely scabrid-aristate, ferruginous; utricles spreading, .19—23 in. long, ovate or elliptic below, narrowed into a slender beak nearly as long, several-ribbed, glabrous.....20. *raphidocarpa*.

Spikelets elongate, rarely less than 1 in. long; ♂ portion often as long as ♀:—

Utricles gibbous, broadly ovoid, obscurely trigonous, coriaceous, .16—18 in. long, beak short, 2-fid, strongly many-ribbed, brown to dark red-brown, glabrous or the beak slightly hispidulous. Stems robust, up to 5 ft. high; leaves often longer, up to 5 in. wide; bracts up to 12 in. long; spikelets linear, up to 2.5 in. long; ♀ glumes broadly ovate, .13—17 in. long, obtuse or acute, sometimes distinctly scabrous-aristate, ferruginous or brown, usually with a broad hyaline margin, ribbed.....21. *baccans*.

Utricles not gibbous, hardly trigonous, membranous, .14—18 in. long, elliptic below, narrowed into a moderately long, 2-fid beak, narrowed to the base, hardly ribbed, pale-brown or greenish, margins usually spinulose; ♀ glumes ovate, lanceolate, acute, usually scabrid-aristate, .15—19 in. long, pale-brown, not or hardly ribbed, margins seldom narrowly hyaline. Stems, leaves, bracts and spikelets as in the last species.....22. *myosurus*.

1. *CAREX CHRISTII*, Boeck.
Nilgiri Hills (*vide* Kükenthal).
2. *CAREX NUBIGENA*, D. Don; F. B. I. vi. 702.
Nilgiri, Anamalai (Beddome) and Pulney Hills; 6,000—8,000 ft.
3. *CAREX FOLIOSA*, D. Don. *C. muricata*, Linn., var. *foliosa*, C. B. Cl.; F. B. I. vi. 703.
Nilgiri and Pulney Hills; 6,500—8,000 ft.
4. *CAREX LONGIPES*, D. Don, var. *DISSITIFLORA*, C. B. Cl.; F. B. I. vi. 705.
Nilgiri, Anamalai (Beddome) and Pulney Hills; High Wavy Mountain (Blatter and Hallberg); 6,000—8,000 ft.
5. *CAREX BRUNNEA*, Thunb.; F. B. I. vi. 705.
Nilgiri, Anamalai (Beddome), Pulney and Tinnevely Hills; 5,000—7,000 ft.
6. *CAREX LONGICRURIS*, Nees; F. B. I. vi. 705.
Nilgiri and Anamalai (Beddome) Hills; 7,000—8,000 ft.
7. *CAREX LEUCANTHA*, Arn.; F. B. I. vi. 721.
Courtallam; Tinnevely Hills.
8. *CAREX WALKERI*, Arn.; F. B. I. vi. 725.
Nilgiri and Tinnevely (Beddome) Hills; 6,000—7,500 ft.
9. *CAREX BREVICULMIS*, R. Br.; F. B. I. vi. 746.
Nilgiri and Pulney Hills; at high elevations.
10. *CAREX JACKIANA*, Boott.; F. B. I. vi. 735.
Nilgiri, Anamalai (Beddome), Shevaroy (Beddome) and Tinnevely (Hooper and Ramaswami) Hills; High Wavy Mountain (Blatter and Hallberg); 3,500—7,000 ft.
11. *CAREX SPECIOSA*, Kunth; F. B. I. vi. 729.
Rampa (Ramaswami), Nilgiri, Pulney and Tinnevely (Beddome) Hills; 3,000—4,000 ft.
12. *CAREX HEBECARPA*, C. A. Mey, var. *LIGULATA*, Kükenth. *C. ligulata*, Nees; F. B. I. vi. 747.
Nilgiri and Pulney Hills; 5,000—7,000 ft.

13. CAREX PHACOTA, Spr.; F. B. I. vi. 708.
Nilgiri, Bolampatti (Beddome), Anamalai (Fischer), Pulney and Tinnevely Hills; High Wavy Mountain (Blatter and Hallberg); 5,000—7,000 ft.
14. CAREX PSEUDO-APERTA, Boeck.
Nilgiri Hills at 6,000 ft. (Gamble).
15. CAREX MACULATA, Boott; F. B. I. vi. 735.
Nilgiri Hills; 5,000—7,000 ft.
16. CAREX VICINALIS, Boott; F. B. I. vi. 735.
Nilgiri Hills (Schmidt).
17. CAREX FILICINA, Nees; F. B. I. vi. 717.
W. Gháts; 6,000—8,000 ft.
18. CAREX WIGHTIANA, Nees; F. B. I. vi. 720.
Courtallam; Travancore in low country in evergreen forest.
19. CAREX LINDLEYANA, Nees; F. B. I. vi. 721.
Nilgiri, Anamalai (Beddome) and Pulney Hills; High Wavy Mountain (Jacob); 6,000—7,000 ft.
Var. *mercarenis*, Fischer. *C. mercarenis*, Hochst.; F. B. I. vi. 719.
Partial panicles laxer; spikelets narrower; utricles narrower, more or less puberulous.
W. Gháts from S. Kanara to Tinnevely; 3,600—8,000 ft.
Var. *major*, Fischer. *C. mercarenis*, Hochst., var. *major*, Steud.; F. B. I. vi. 719. Spikelets .5—75 in. long; utricles distant, scabrous-hairy.
Mercara (Hohenacker); Attapadi (Fischer), Anamalai (Beddome) and Pulney Hills; High Wavy Mountain (Blatter and Hallberg); 5,000—8,000 ft.
20. CAREX RAPHILOCARPA, Nees; F. B. I. vi. 719.
Pulney Hills at 6,000 ft.
21. CAREX BACCANS, Nees; F. B. I. vi. 722.
Mahendragiri in Ganjam District (Fischer); Godavary District (Narayanswami); W. Gháts; 3,000—7,000 ft.
22. CAREX MYOSURUS, Nees; F. B. I. vi. 723.
Rampa (Narayanswami) and Dindigul Hills at 2,600 ft.; throughout the W. Gháts; 4,000—7,000 ft.

FLORA
OF THE
PRESIDENCY OF MADRAS

J. S. GAMBLE

PART X
GRAMINEAE

BY
C. E. C. FISCHER
LATE OF THE INDIAN FOREST DEPARTMENT

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ROYAL BOTANIC GARDENS, KEW ;
21st November, 1934.

FLORA OF MADRAS

Family CLXXVI. GRAMINEAE.

Erect, decumbent or creeping, sometimes floating herbs, or tall reeds, shrubs or trees or climbers; annual or perennial by means of rhizomes. Stems simple or more commonly branched from the base, generally terete and hollow between the nodes. *Leaves* alternate, commonly 2-ranked, nearly always with a sheathing base split down one side; ligule at the junction of the blade (or petiole) and the sheath consisting of a membrane or a fringe of hairs, rarely absent; blades usually long and narrow, rarely ovate parallel-nerved, sessile or sometimes petioled. *Inflorescence* terminal, rarely terminal and lateral, composed of paniced, racemose, simply or compoundly spicate, or capitate spikelets, rarely reduced to a single spikelet; rarely dioecious. *Flowers* solitary or 2—many aggregated in a spikelet. *Spikelets* homogeneous or differing in sex and shape; 1-sexual or 2-sexual with all the florets 2-sexual or 2-sexual with ♂ only or ♀ and ♂ in the same spikelet. The two, seldom more, lowest bracts of the spikelet (*glumes*), one sometimes absent, empty, the rest (*lemmas*) containing a naked floret or sometimes empty by reduction, usually with a smaller bract (*palea*) between the floret and the axis. Usually there are 2, rarely 3—several, hyaline, usually minute scales (*lodicules*) within the palea, representing the reduced perianth. *Stamens* 3, rarely 6, 4, 2 or 1, very rarely more than 6; filaments slender, often very long, free, rarely united; anthers versatile with 2 parallel cells. *Ovary* entire, 1-celled; styles 2, rarely 3 or 1, free or connate at the base, usually clothed above with simple or branched stigmatic hairs; ovule solitary, erect, anatropous. *Fruit* a grain, free within the lemma and palea or adnate to either or both. *Seed* erect, albumen copious, floury; embryo minute or large, at the base of and outside the albumen. Mature spikelets falling entire from the tips of their pedicels or together with the pedicel or a part of it or with a part of the rhachis, or else breaking up above the glumes into separate false fruits, rarely persistent and shedding the grain.

The genera are those adopted by Stapf in the 'Flora of Tropical Africa' wherever possible, and the key to the genera is based on that in the same work. For the necessary modifications much assistance was derived from Haines's 'Botany of Bihar and Orissa,' Cooke's 'Flora of the Bombay Presidency,' together with Blatter and McCann's revision thereof, and Melle. A. Camus's key in 'Flore générale de l'Indo-Chine.'

Mr. C. E. Hubbard, of Kew, has given much help and advice, but he is in no way responsible for the ultimate result.

The measurements given for culms exclude the inflorescence; those of the leaves refer to the blades only, and those of the glumes and lemmas exclude cusps, aristas or awns if present, unless otherwise stated.

Sexes in different inflorescences or if in the same then ♀ few at the base and ♂ above:—

Monoecious; leaves flat, not spiny; ♂ paniced or spicate:—

Sexes in separate inflorescences; ♂ in large panicles, ♀ spikes in an axillary sheath, fused together to form a spongy body.....1. *Zea*.

Sexes in the same inflorescence; ♂ in several pairs, ♀ solitary or few:—

♀ solitary within a closed, globose, stony bract.....2. *Coix*.

♀ 1—several, each embraced by the oblong, dorsally compressed, coriaceous lower glume which is open ventrally.....3. *Chionachne*.

Dioecious; leaves involute, rigid, spiny; inflorescence in globose heads

4. *Spinifex*.

Sexes mixed:—

Mature spikelets falling entire from or with their pedicels or with the contiguous joint of the rhachis, all alike or differing in sex and structure, perfect ones with 2 heteromorphous florets, lower ♂ or empty, upper bisexual:—(5—67).

Spikelets usually in pairs, one sessile, the other, rarely both, pedicelled, rarely 3-nate or solitary on the axes of variously arranged, often spiciform racemes; glumes firmer than the lemmas; lemmas membranous, often hyaline, the upper sometimes awned or reduced to an awn:—(5—44).

Joints and pedicels not bulbous, not adnate to one another, if thick then the spikes digitate or in spathaceous panicles:—(5—38).

All spikelets alike in shape and sex or if dissimilar then paleas very short or absent:—

Spikes in compound panicles or racemose on an elongate common axis; spikelets 1-flowered:—

Rhachis tough; all spikelets pedicelled:—

Panicle thyrsoid; callus long-silky-hairy; spikelets 2-nate, one long, one short-pedicelled:—

Panicle narrow-thyriform, silvery hairy; lemmas awnless

5. *Imperata*.

Panicle broadly fan-shaped, brownish-hairy; lemmas usually awned

6. *Miscanthus*.

Panicle narrow; spikelets solitary; glumes shortly brown-hairy

7. *Cleistachne*.

Rhachis readily disarticulating; spikelets 2-nate, one sessile, the other pedicelled:—

Spikelets awnless. Leaves not narrowed to the base, not petioled:—

Glumes membranous or chartaceous at the base only. Panicles wide, more or less silvery-plumose.....8. *Saccharum*.

Glumes chartaceous or coriaceous throughout. Panicles narrow, rufous-hairy, not plumose.....9. *Eriochrysis*.

Spikelets awned. Leaves narrowed at the base, often long petioled

10. *Spodiopogon*.

Spikes digitate or solitary; spikelets 1-flowered, or if 2-flowered then the lower glumes channelled:—

Rhachis inarticulate; spikelets not paired.....11. *Dimeria*.

Rhachis articulate:—

Spikes solitary, capillary; spikelets 2-awned.....12. *Pogonatherum*.

Spikes digitate; spikelets 1—2-awned:—

Rhachis fragile; pairs of spikelets always one sessile and one pedicelled; glumes $\cdot 1$ in. or more long; upper lemma much wider than its awn.....13. *Eulalia*.

Rhachis more or less persistent; pairs of spikelets often both pedicelled; glumes less than $\cdot 1$ in. long; upper glume hardly wider than its awn:—

Lower glume flat or depressed on the back, not channelled

14. *Pseudopogonatherum*.

Lower glume deeply channelled on the back.....15. *Microstegium*.

Sessile and pedicelled spikelets dissimilar, sessile bisexual, pedicelled ♂, empty or 0, or if similar (*Pollinidium*) then the paleas well-developed and the rhachis compressed:—

Fertile spikelets 2-flowered:—

Pedicelled spikelets present:—

Both spikelets awned; joints of rhachis and pedicels flattened or thickened; paleas well developed:—

Rootstock and base of culm clothed with woolly sheaths; rhachis flattened; spikelets all similar and homogamous...16. **Pollinidium**. Culm not woolly at base; joints and pedicels stout; spikelets heterogamous:—

Spikes clustered or digitate; lower glumes not channelled
17. **Ischaemum**.
Spikes solitary; lower glumes channelled on the back

18. **Sehima**.
Sessile spikelet awnless; lower glumes 3-toothed...19. **Lophopogon**.
Pedicelled spikelets suppressed, pedicels only present:—

Spikes usually 2; margins of glumes smooth...20. **Apocopis**.

Spikes solitary; margins of lower glumes spinulose- or bristle-pectinate...21. **Eremochloa**.

Fertile spikelets 1-flowered:—

Panicles not subtended by spathes:—

All pairs of spikelets alike:—

Upper lemma awned from the back below the middle; spikes digitate...22. **Arthraxon**.

Upper lemma awned from the tip or the sinus:—

Upper lemma reduced to the hyaline stipitiform base of the awn; joints and pedicels filiform with a translucent longitudinal depression:—

Racemes in compound panicles...23. **Capillipedium**.

Racemes subdigitate, fascicled or verticillate on an elongate axis...24. **Amphilophis**.

Upper lemma not reduced, 2-fid, awned from the sinus; joints and pedicels solid:—

Raceme of many pairs of spikelets:—

Primary branches of the panicle whorled; lower glumes coriaceous, muricate or tuberculate...25. **Vetiveria**.

Primary branches not whorled; lower glumes chartaceous, smooth...26. **Pseudosorghum**.

Raceme of few pairs of spikelets, rarely 6, sometimes reduced to 1 sessile and 2 pedicelled:—

Spikelets dorsally compressed; pedicelled spikelet sometimes reduced to a pedicel only; sessile spikelet awned or not
27. **Sorghum**.

Spikelets laterally compressed, raceme nearly always reduced to 1 sessile and 2 pedicelled spikelets on the tips of slender peduncles, all awned...28. **Chrysopogon**.

Lowest 1 or more pairs of spikelets homogeneous and differing from all above them:—

Spikes digitate, rarely solitary; sessile spikelets dorsally compressed; callus of lemma short...29. **Dichanthium**.

Spike solitary; sessile spikelets subcylindric; callus elongate, pungent...30. **Heteropogon**.

Panicles subtended by spathes; spikes usually 2, or 1, rarely more, on a common peduncle sheathed by a spatheole:—

Spikes reduced to 1 or a few nodes with or without a surrounding involucre of modified ♂ or empty spikelets:—

Involucre of modified spikelets present:—

Involucral spikelets persistent, the rest jointed on the rhachis and falling separately...31. **Themedia**.

Involucral spikelets jointed on the peduncle and falling together with the rest...32. **Iseilema**.

No involucre present:—

Callus of spikelet not inflated...33. **Pseudanthistiria**.

Callus much inflated...34. **Apluda**.

Spikes many-noded, not reduced nor involucred:—

Spikes solitary in each spatheole:—

Joints and pedicels slender...35. **Eremopogon**.

Joints and pedicels thickened upwards to a cupped apex, often with a dentate terminal appendage...36. **Schizachyrium**.

Spikes twin in each spatheole:—

All pairs of spikelets similar; racemes terminating the culms

Lowest pair of spikelets of one or both spikes homogeneous; 37. *Andropogon*.

lowest joint sometimes much thickened; plant often aromatic; panicles decompound.....38. *Cymbopogon*.

Joints of the rhachis and often the pedicels much swollen, sometimes joint and pedicel fused to form a cylindric axis in which the lower glume is sunk; pedicelled spikelet sometimes suppressed:—

Sessile and pedicelled spikelets very unlike, sessile, globose

39. *Hackelochloa*.

Spikelets more or less alike and compressed or the pedicelled suppressed:—

Spike readily disarticulating:—

Lower glumes convex; pedicelled spikelets suppressed; pedicels fused with the joints.....40. *Ophiuros*.

Lower glumes flat; ends of joints hollowed out:—

Pedicelled spikelets as large as or only slightly smaller than the sessile:—

Raceme terete; lower glumes of sessile spikelets not or very narrowly winged, awnless.....41. *Rottboellia*.

Raceme compressed; lower glume of sessile spikelets broadly winged or if only winged in upper half then 1—2-awned

42. *Manisuris*.

Pedicelled spikelets rudimentary; sessile spikelets deeply sunk in opposite cavities.....43. *Mnesithea*.

Spike with cohering joints with truncate tips, compressed

44. *Hemarthria*.

Spikelets in usually continuous spikes, racemes or panicles; glumes herbaceous or membranous, the lower generally smaller, sometimes minute or absent; lower lemma generally resembling the upper glume, the upper always fertile, ultimately rigid, chartaceous or crustaceous, muticous, mucronate or awned:—

Upper floret only fertile; lower lemma not hardened:— (45—66)

Inflorescence of usually slender, spiciform, digitate, subdigitate or distant, very rarely solitary racemes; fruiting lemma usually with flat thin margins with the usually minute lower palea attached to its base:—

Spikelets muticous; lower lemmas with 5—7 close, prominent nerves

45. *Digitaria*.

Spikelets awned or aristate; lower lemma smooth.....46. *Alloteropsis*.

Inflorescence usually different, various; fruiting lemma with more or less inrolled margins; lower palea not attached to the upper lemma:—

Spikelets falling entire and singly from the persistent pedicels, rarely falling with the contiguous joints of an articulate rhachis (51. *Stenotaphrum*):— (47—64)

Spikelets muticous, or if awned then subsessile in false second spikes with the awns from the entire or the very slightly notched tips of the upper glumes and the lower lemmas, or the tips of the lower or both glumes; fruiting lemmas crustaceous:— (47—63)

Inflorescence never an open or contracted-cylindric panicle:—

Back of fruit turned away from the axis:—

Spikelets strongly laterally compressed; lower glume herbaceous, as long as the spikelet.....47. *Pseudechinolaena*.

Spikelets more or less dorsally compressed; lower glume never herbaceous:—

Bases of spikelets with a swollen annular callus formed by the rudimentary lower glume and the base of the rhachilla

48. *Eriochloa*.

Bases of spikelets devoid of swollen callus, lower glume distinct

49. *Brachiaria*.

Back of fruit turned towards the axis:—

Lower glume absent or reduced to a scale; spikelets usually conspicuously plano-convex with the flat side turned away from the rhachis.....50. *Paspalum*.

Lower glume well developed:—

Rhachis flat, articulated; spikelets in cavities of the rhachis, ultimately falling with the contiguous joint

51. *Stenotaphrum*.

Rhachis not articulated; spikelets falling from their pedicels:—

Glumes muticous:—

Fruiting lemmas acute, not mucronate; spikelets solitary, their sides contiguous.....52. *Paspalidium*.

Fruiting lemmas obtuse, abruptly mucronate; spikelets paired or if solitary then their backs contiguous

53. *Urochloa*.

Glumes, at least the upper, caudate or awned:—

Leaves linear; glumes entire, the lower awnless

54. *Echinochloa*.

Leaves lanceolate; glumes slightly notched, the lower awned.....55. *Oplismenus*.

Inflorescence an open or a contracted, cylindric spiciform panicle:—

Spikelets not supported by bristle-like branchlets, rarely replaced by a minute bristle (57. *Holcolemma*):—

Spikelets not gibbous, or if slightly so then not in cylindric, spiciform racemes:—

Panicles open, or if contracted the branches spreading, not spiciform:—

Glumes similar, subequal, shorter than the spikelet:—

Rhachis branched, branches long; base of rather broad leaves rounded; glumes lanceolate, acuminate, prominently nerved; fruiting lemmas smooth.....56. *Ottochloa*.

Rhachis simple; base of very narrow leaves narrowed; glumes broadly ovate, subacute, not prominently nerved; fruiting lemmas finely transversely rugulose

57. *Holcolemma*.

Glumes dissimilar, the lower much the shorter, rarely absent

58. *Panicum*.

Panicles contracted, dense, branches appressed spiciform

59. *Hymenachne*.

Spikelets distinctly gibbous and oblique, or if only slightly so then in cylindric, spiciform racemes:—

Spikelets laterally much compressed.....60. *Cyrtococcum*.

Spikelets turgid, not compressed.....61. *Sacciolepis*.

Spikelets, at least the upper of each branch, supported by bristle-like branchlets:—

Terrestrial, erect; panicle contracted, usually spiciform; bristles many, not produced beyond the terminal spikelet

62. *Setaria*.

Aquatic, decumbent; panicle open; bristle solitary, much produced beyond the terminal spikelet.....63. *Pseudoraphis*.

Spikelets finely awned or mucronate from the sinus of the distinctly notched upper glumes and lower lemmas, the latter rarely muticous, delicately pedicelled, paniced; lower glume minute; fruiting lemma rigidly membranous.....64. *Rhynchelytrum*.

Spikelets involucrate with spines or bristles, falling in groups, seldom singly:—

Involucre of free, naked or feathery bristles.....65. *Pennisetum*.

Involucre of spines or rigid bristles united into a hard cup

66. *Cenchrus*.

Both florets fertile, or if the lower ♂ then its lemma hardened and more or less resembling the upper.....67. *Isachne*.

Mature spikelets breaking up, leaving the persistent or subpersistent glumes on the rhachis or pedicels, or if falling entire then not consisting of 2 heteromorphic florets:—

Blades of leaves not transversely veined or articulate on the sheaths, or if so (112. *Lophatherum*, 113. *Centothea*) not large woody shrubs or trees:— (68—126)

Awn of fertile floret if present kneed and twisted below the knee (rarely straight in reduced forms):—(68—85)

Spikelets 2—several-flowered:—

Florets 2 only, dissimilar; lower lemma awnless; awn of upper lemma, when present, from the entire tip:—

Tall reeds; leaves distichous; panicles large, decompound; spikelets very small, jointed on the pedicels; upper lemma awnless

68. *Thysanolaena*.

Small or moderate-sized plants; leaves not distichous; panicles small, not decompound; spikelets not jointed on the pedicels; upper lemma usually awned, sometimes also with 2 setae.....69. *Arundinella*.

Florets 2—several, all alike or the uppermost reduced; lemmas membranous, often with hyaline margins; awn, when present, from the back or the sinus or from between bristles:—

Small or moderate-sized plants; panicles not decompound; rhachilla rarely jointed between the lemmas:—

Florets 2—several; lemmas 2-cleft, usually awned from the back below the sinus:—

Perennials; spikelets moderate-sized, erect or suberect; glumes usually 1—3-nerved.....70. *Avenastrum*.

Annuals; spikelets large, pendulous; glumes 7—9-nerved

71. *Avena*.

Florets 2 only; lemmas entire:—

Weak marsh plants; glumes not keeled; rhachilla elongate between the lemmas; upper lemma the longer, coriaceous

72. *Coelachne*.

Rigid, erect, terrestrial plants; glumes keeled; rhachilla short between the equal, chartaceous lemmas.....73. *Zenkeria*.

Very tall reeds; panicles decompound; rhachilla jointed between the lemmas:—

Lemmas silky-hairy; rhachilla elongate, glabrous or short-hairy at the base:—

Lemmas hairy all over the back below the middle.....74. *Arundo*.

Lemmas hairy from the nerves on the sides only.....75. *Neyraudia*.

Lemmas glabrous; rhachilla short, long-hairy.....76. *Phragmites*.

Spikelets 1-flowered:—

Inflorescence paniced:—

Panicles dense, oblong-spiciform or lobulate.....77. *Polypogon*.

Panicles effuse or narrow, not dense or spiciform:—

Lemma cylindric, coriaceous, tightly enfolding the grain, awned, awns often 3.....78. *Aristida*.

Lemma lanceolate, membranous or cartilaginous, not enfolding the grain:—

Spikelets not jointed on the pedicels; awn, when present, from the back of the lemma.....79. *Agrostis*.

Spikelets jointed on the pedicels; usually awned from the tip of the lemma.....80. *Garnotia*.

Inflorescence spicate or racemose:—

Racemes 2—3, seldom solitary; rhachis broad, flat, disarticulating; spikelets mixed with rigid flowerless glumes.....81. *Trachys*.

Racemes solitary; rhachis narrow, not flat, not articulated; flowerless glumes absent:—

Upper glume 5-ribbed, armed with hooked spinules.....82. *Tragus*.

Glumes neither ribbed nor spinulose:—

Rhachis straight; spikelets spreading:—

Spikelets minute, shaped like a shoe or a bird's head, awnless

83. *Lopholepis*.

Spikelets larger, narrowly lanceolate; glumes tapering into a long fine awn.....84. *Perotis*.

Rhachis flexuous, forming recesses into which the spikelets are appressed.....85. *Zoysia*.

Awn of the fertile floret, when present, never kneed:—

Lemmas typically 3-nerved:—

Inflorescence panicle, or if spicate (some *Eragrostis*) then not secund:—

Spikelets 1-flowered, very small; glumes and lemmas very similar, awned.....86. **Sporobolus.**

Spikelets 2—many-flowered, or if only 1-flowered then glumes and lemmas dissimilar:—

Lemmas entire:—

Glumes rigid, coriaceous, awned.....87. **Myriostachya.**

Glumes membranous or cartilaginous, not awned, at most caudate-acuminate:—

Upper glumes 1-nerved:—

Spikes short, straight, crowded; spikelets closely packed.....88. **Desmostachya.**

Spikes slender, long, flexuous; spikelets distant.....89. **Leptochloa.**

Upper glumes 3—5-nerved:—

Lower glume 1-nerved, upper 3-nerved; lemmas moderately rigid; rachilla glabrous.....90. **Eragrostis.**

Lower glume 3-nerved, upper 5-nerved; lemmas coriaceous; rachilla joints bearded.....91. **Halopyrum.**

Lemmas emarginate:—

Spikelets laterally compressed, sessile or subsessile, few—many-flowered; rachilla not produced beyond the lemmas.....92. **Diplachne.**

Spikelets terete, pedicelled, 1-flowered; rachilla produced beyond the lemma into a filiform arista.....93. **Dichætaria.**

Inflorescence of sessile or subsessile spikelets in 2-ranked, secund, usually dense, solitary, digitate or racemose arranged spikes:—

Spike solitary, rarely twin:—

Spikelets more or less sunk in the rachis.....94. **Oropetium.**

Spikelets not sunk in the rachis:—

Spikelets awnless.....95. **Microchloa.**

Spikelets awned:—

Spikelets 1—2-flowered in pedicelled, articulate clusters; rachilla produced beyond the upper lemma.....96. **Melanocenchris.**

Spikelets 1—many-flowered, sessile, not in clusters:—

Spikelets 3—many-flowered; lower glume usually lodged in a furrow in the rachis; rachilla not produced beyond the terminal lemma.....97. **Tripogon.**

Spikelets 1—3-flowered; lower glume not lodged in the rachis; rachilla produced beyond the uppermost lemma.....98. **Enteropogon.**

Spikes digitate, umbelled or racemose, very rarely solitary or if so then lemmas obovate:—

Spikelets 1-flowered; spikes always digitate.....99. **Cynodon.**

Spikelets 2—several-flowered, sometimes only 1—2 fertile:—

Fertile florets 1—3 with 1 or more imperfect above or below; spikes umbelled or racemose, rarely solitary; lemmas awned or aristate.....100. **Chloris.**

Fertile florets 2—several, none imperfect:—

Spikes digitate or subdigitate or capitate, usually rigid; glumes shorter than lemmas:—

Spikes terminated by a spikelet; glumes and lemmas muticous or obscurely mucronate.....101. **Eleusine.**

Spikes terminating in a sharp point; upper glume and lemmas rigidly mucronate or cuspidate.....102. **Dactyloctenium.**

Spikes racemose, slender, spreading or deflexed; glumes much longer than the lemmas

Lemmas typically 5—many-nerved:—

[103. **Dinebra.**

- Lemmas broad, 4—9-lobed:—
 Inflorescence a contracted panicle; lemmas 9-nerved and -awned
 104. *Enneapogon*.
 Inflorescence a simple spike; lemmas spirally arranged in a cone,
 4-nerved, and lobed, 1—5-awned.....105 *Pommereuilla*.
 Lemmas entire or 2-, rarely 3-lobed:—
 Spikelets in compact, subcapitate or cylindric, often interrupted,
 spikes:—
 Leaves flat, neither distichous nor pungent, usually long; spikes
 cylindric, often interrupted.....106. *Elytrophorus*.
 Leaves convolute, distichous, rigid, pungent, 1—2 in. long; spikes
 capitate.....107. *Aeluropus*.
 Spikelets not compact, in spikes, racemes or panicles:—
 Inflorescence paniced:—
 Glumes absent, or minute or setaceous; fertile floret solitary:—
 Lower florets represented by 2 scales or bristles; glumes minute,
 scale-like or subulate.....108. *Oryza*.
 Lower florets suppressed; glumes 0 or reduced to a rim:—
 Glumes represented by an entire or 2-lobed rim; lemmas
 awnless.....109. *Leersia*.
 Glumes suppressed; lemmas awned.....110. *Hygrophiza*.
 Glumes, at least the upper, developed:—
 Two lower lemmas 2-lobed, awned from below the sinus
 111. *Anthoxanthum*.
 Lemmas entire:—
 Leaves flat, lanceolate, with numerous transverse venules:—
 Spikelets not compressed; fertile floret 1, with several closely
 sheathing, cuspidate empty lemmas above
 112. *Lophatherum*.
 Spikelets compressed; fertile florets 1—3, empty lemmas
 0—1-several, usually with erect or deflexed bulbous-based
 bristles; muticous.....113. *Centotheca*.
 Leaves usually narrow, no transverse venules:—
 Lower 1—3 lemmas bisexual, those above empty, enfolding
 each other to form a clavate or oblong terminal body
 114. *Melica*.
 Upper lemmas not in a terminal sterile body:—
 Glumes and lemmas muticous; spikelets laterally com-
 pressed:—
 Panicles expanded; glumes and lemmas subequal:—
 Spikelets ovate or triangular; pedicels capillary;
 glumes and lemmas broadly ovate, obtuse, not keeled
 115. *Briza*.
 Spikelets oblong; pedicels not capillary; glumes and
 lemmas ovate-lanceolate, acute, keeled.....116. *Poa*.
 Panicles narrow; spikelets elongate-oblong; glumes
 much shorter than the strongly nerved lemmas
 117. *Glyceria*.
 Glumes and lemmas caudate, aristate or awned:—
 Panicles contracted; spikelets in dense clusters;
 rhachilla short between the lemmas.....118. *Dactylis*.
 Panicles more or less expanded; spikelets not clustered;
 rhachilla elongate between the lemmas:—
 Lower glume much the shorter; lemmas subulate,
 not keeled.....119. *Vulpia*.
 Glumes subequal; lemmas oblong or lanceolate:—
 Lemmas rounded on the back or keeled only in
 the upper half, .25 in. or less long...120. *Festuca*.
 Lemmas sharply keeled throughout, .28 in. or more
 long.....121. *Bromus*.
 Inflorescence a simple spike or raceme:—
 Leaves narrowed into a petiole; lemmas convolute, acutely 2-fid
 122. *Streptogyne*.

Leaves not petioled; lemmas entire:—

Spikelets distant on the rhachis:—

Rhachis straight, not recessed; spikelets nearly terete, not distichous.....123. **Brachypodium.**

Rhachis flexuous, recessed; spikelets much compressed, distichous.....124. **Lolium.**

Spikelets aggregated into a dense oblong head:—

Spikelets solitary at the nodes, without involucre outer glumes.....125. **Triticum.**

Spikelets 3-nate at the nodes; outer glumes of each cluster together forming a quasi involucre.....126. **Hordeum.**

Blades of leaves usually transversely veined, articulate on their sheaths; large woody shrubs or trees with large culm-sheaths with an imperfect blade:—
Bamboos.

Paleas differing from the lemmas, 2-keeled, or if not keeled then the stamens monadelphous:—

Staminal filaments free:—

Stamens 3.....127. **Arundinaria.**

Stamens 6:—

Spikelets in globose congested heads.....128. **Dendrocalamus.**

Spikelets not in globose congested heads:—

Imperfect blade of culm-sheath broadly triangular, erect; paleas 5—7-nerved between the keels; pericarp thin, adnate to the seed
129. **Bambusa.**

Imperfect blade linear-ensiform, recurved; paleas 1-nerved between the keels; pericarp crustaceous, free from the seed

130. **Teinostachyum.**

Staminal filaments united into a tube; stamens 6.....131. **Oxytenanthera.**

Paleas 0 or resembling the lemmas, not keeled; stamens usually numerous; filaments free or united.....132. **Ochlandra.**

1. *Zea*, Linn.

Tall, stout, annual herbs. *Leaves* large, flat. *Inflorescence* monoeious; ♂ spikelets in large terminal subdigitate or racemose panicles of spiciform racemes; axes of ♀ spikes fused into a spongy, subcylindric core in axillary sheaths. ♂ spikelets 2-nate, one pedicelled, the other sessile, 2-flowered. *Glumes* subequal, membranous. *Lemmas* similar, hyaline, their paleas similar. *Lodicules* 2, fleshy. *Stamens* 3. ♀ spikelets 2-nate in 4—11 longitudinal rows, slightly immersed in the axis; florets 2, the lower reduced to an empty lemma. *Glumes* similar, very broad, fleshy below, hyaline above. *Lemmas* like the glumes; paleas short, broad, the lower sometimes wanting. *Lodicules* 0. *Styles* long, 2-fid at the tip, exserted in long silky tassels from the sheathing bracts. *Grain* subglobose, surrounded by the dried-up glumes, lemmas and paleas.

ZEAL MAYS, Linn.; *F. B. I.* vii. 102.

A S. American plant cultivated in many localities for its edible grain and its fodder leaves. Maize or Indian Corn.

Stems robust, up to 10 ft. or more high; leaves up to 3 ft. long and 4 in. wide; ♂ spikelets 25—35 in. long; styles several inches long. Vern. *Ur.* Mokka; *Tel.* Mokka jounalu; *Tam.* Makka cholam, Turaka cholam; *Mal.* Makka cholam; *Kan.* Makkai jola.

2. Coix, Linn.

Annual or perennial, tall, erect or floating plants. *Leaves* flat. *Inflorescence* of fasciated axillary and terminal spiciform racemes, consisting usually of one ♀ spikelet completely enclosed in a globose or ovoid basal bract through which the rhachis grows out and bears the ♂ spikelets above. *Bract* eventually stony and polished, sometimes continued into a leafy blade, rarely a second bract above. ♂ *spikelets* imbricate in pairs or threes, one of them pedicelled. *Glumes* subequal, herbaceous, the lower flat with 2 lateral winged keels, the upper boat-shaped with a median keel. *Florets* 2, both staminate or the upper empty. *Lemmas* similar, membranous, the upper shorter; *paleas* hyaline. *Lodicules* 2, cuneate, fleshy. *Stamens* 3. ♀ *spikelets* enclosed in the bract with 2 bare pedicels. *Glumes* hyaline-membranous and inflated below, contracted into an acute cartilaginous beak, the upper acutely keeled between 2 deep grooves. *Florets* 2, the lower usually reduced to an empty lemma resembling the lower glume, *upper lemma* resembling the upper glume, with a broad palea. *Lodicules* 0. *Stamens* 3, rudimentary. *Style* long, deeply 2-fid, exerted from the mouth of the sheathing bract. *Grain* subglobose or ellipsoid, enclosed in the bract; embryo as long.

Annual; culms up to 5 ft. high; leaves linear-lanceolate, 5—18 in. long, .5—2 in. wide, base cordate, rarely narrowed; peduncles up to 3 in. long; ♀ bract .3—5 in. long; ♂ racemes .4—2 in. long; spikelets 2—3-nate; wings of lower glume .03—0.7 in. wide.....1. *Lacryma-Jobi*.
 Perennial; culms up to 15 ft. high; leaves linear, 1—4 ft. long, .1—7 in. wide, base narrowed or slightly rounded, not cordate; peduncles up to 7 in. long; ♂ racemes .7—2.5 in. long; spikelets usually 3-nate; wings of lower glume .02—0.5 in. wide.....2. *gigantea*.

1. COIX LACRYMA-JOBI, Linn.; F. B. I. vii. 100; S. I. G. fig. 126.

In all Districts except the hottest and driest localities; from near sea-level to 7,000 ft. Job's tears.

Sometimes cultivated by hill tribes for the grain. The stony bracts are strung by the hillmen into necklaces and other ornaments. The leaves are readily eaten by cattle. Vern. *Hind*. Sankru; *Tam*. Kattu-kundamani.

2. COIX GIGANTEA, Roxb. *C. Lacryma-Jobi*, Linn. var. *gigantea*, Stapf; F. B. I. vii. 100.

In the same localities as the last species.

3. Chionachne, R. Br.

Annual or perennial erect herbs. *Leaves* flat, narrow. *Inflorescence* of spiciform racemes; racemes entirely ♂ or with 1 or more ♀ spikelets at the base, at first enclosed in spathiform bracts; rhachis articulate at the base and above each ♀ spikelet. ♂ *spikelet* 2-flowered, solitary or 2-nate and then one pedicelled. *Glumes* dissimilar, lower herbaceous, shallowly concave with a narrow membranous wing on each side, upper chartaceous or rarely herbaceous, narrower. *Lemmas* similar, membranous, paleate, both staminate or the upper empty. *Lodicules* 2, cuneate. *Stamens* 3. ♀ *spikelets* oblong, dorsally compressed, 2-flowered. *Glumes* very dissimilar; lower thickly coriaceous,

embracing but not concealing the rhachis between its inflexed margins, enclosing the upper glume and floret; upper membranous or chartaceous. *Lemmas* delicately hyaline; the lower empty, paleate or not; the upper narrow, its palea wrapped round the pistil. *Lodicules* 0. *Styles* very long. *Grain* orbicular, compressed, ventrally channelled, free inside the hardened lower glume.

Culms up to 2 ft. high; leaves up to 12 in. long, .1—25 in. wide; spathes always closed, 1—1.5 in. long, muticous or mucronate; racemes solitary; ♀ spikelets 2—5, .27—34 in. long; ♂ spikelets usually many; wings of lower glume glabrous, not ciliate.....1. *semiteres*.

Culms up to 8 ft. high; leaves up to 3 ft. long, .22—65 in. wide; spathes chaffy, at first plicate, soon opening out, .5—1 in. long with an arista .2—5 in. long; racemes umbelled; ♀ spikelets solitary, .19—3 in. long; ♂ spikelets usually few; wings of lower glumes more or less puberulous, ciliate.....2. *Koenigii*.

1. *CHIONACHNE SEMITERES*, C. E. C. Fischer n. comb. *Polytoca semiteres*, Benth. ex Hook. f.; F. B. I. vii. 101.

S. Arcot District (Barber); Tinnevely District at Palamcottah (Wight).

2. *CHIONACHNE KOENIGII*, Thw. *Polytoca barbata*, Stapf ex Hook. f.; F. B. I. vii. 102; S. I. G. fig. 127.

Northern Districts as far as S. Bellary and Cuddapah; Nilgiri, N. Coimbatore and Travancore Hills; 200—3,500 ft. Vern. *Kan. Suku dabha*.

4. *Spinifex*, Linn.

Gregarious, much-branched, woody shrubs. *Leaves* rigid, thickly coriaceous, involute, spreading and recurved. *Inflorescence* dioecious, in large, terminal, globose, bracteate heads with radiating spiciform racemes. *Spikelets* articulate on the short pedicels; ♂ several, distichous in each raceme, 2-flowered; ♀ solitary, 1-flowered. *Glumes* chartaceous, acute, subequal or the upper slightly longer. *Lemmas* subequal, paleate; in ♂ both staminate or the lower empty; in ♀ the lower empty, the upper fertile. *Lodicules* 2, large, connate below, strongly nerved. *Stamens* 3. *Styles* 2, long, united below. *Staminodes* sometimes present in ♀ floret. *Grain* clavate, tipped with rigid style-base, free within the hardened lemma and palea.

SPINIFEX LITTOREUS, Merr. *S. squarrosus*, Linn.; F. B. I. vii. 63; S. I. G. figs. 105, 106.

Sea-shore sands in all coastal districts.

Whole plant pale grey or glaucous; stems forming thickets; leaves channelled, up to 13 in. long; ♂ heads up to 6 in. diam., bracts and rhachises pungent, spikelets .36—4 in. long; ♀ heads up to 13 in. diam.; bracts pungent up to 8 in. long, spikelets hidden at the base of the bracts, up to .52 in. long.

A useful sand-binder. Vern. *Ur. Gudukanko*; *Tel. Ravani suruni misalu*; *Tam. Ravanan meesai*.

5. *Imperata*, Cyrill.

Erect, perennial herbs; culms leafy, solid. *Leaves* narrow. *Inflorescence* a terminal, spiciform or thyrsiform panicle. *Spikelets* all alike, generally 2-nate, one short-, the other long-pedicelled,

disarticulating from the pedicels; 2-flowered, the lower usually reduced to an empty lemma, rarely ♂. *Glumes* subequal, membranous, enveloped in long silky hairs from the obscure callus and from the lower half of the glume. *Lemmas* hyaline, mucous; the lower usually much smaller than the glumes; the upper still smaller, with a broad palea. *Lodicules* 0. *Stamens* 1—2. *Styles* 2, connate below. *Grain* oblong; embryo half as long or longer.

IMPERATA, CYLINDRICA, Beauv.

Var. *Koenigii*, Dur. et Schinz. *I. arundinacea*, Cyr.; F. B. I. vii. 106 in part.; S. I. G. fig. 128.

In all Districts, usually in wet situations; sea-level to 7,000 ft. Root-stock stoloniferous, often creeping; culms 1—4 ft. high; leaves 2—2·5 in. long, 1—6 in. wide; panicles 1—8·5 in. long, narrow, white-silky hairy. Cotton grass.

Eaten by cattle only when young and tender. Vern. *Hind.* Dabh.; *Tel.* Dharba, Modewa gaddi; *Tam.* Tharpai pullu, Dharbai pul; *Kan.* Sanna dabbai hullu.

6. *Miscanthus*, Anderss.

Tall, perennial herbs. *Leaves* flat, narrow, long. *Inflorescence* terminal, of numerous spiciform racemes crowded into a usually nodding, fan-shaped corymb; rhachis slender, not articulated. *Spikelets* in similar pairs at the nodes, one long- the other short-petioled, 1-flowered, the callus with long hairs forming a quasi involucre. *Glumes* chartaceous, subsimilar. *Lemmas* hyaline; the lower empty; the upper narrower, 2-toothed or 2-lobed, usually with an awn from the sinus; palea usually minute, containing a bisexual floret. *Lodicules* 2. *Stamens* 2—3. *Styles* 2, free. *Grain* oblong; embryo half as long.

MISCANTHUS NEPALENSIS, Hack.; F. B. I. vii. 107.

Nilgiris at Ootacamund; 7,500 ft. (Narayana and Raju, possibly introduced); without precise locality (Ramaswami). Culms up to 6 ft. high; leaves up to 18 in. long and 6 in. wide; corymbs up to 9 in. long; callus of spikelets very short, bearing numerous fine, brown hairs up to 34 in. long; glumes brown, 08—12; awns 14—42 in. long.

7. *Cleistachne*, Benth.

Annual or perennial erect herbs. *Leaves* flat, elongate. *Panicles* narrow. *Spikelets* solitary, all alike; pedicels slender with thickened tips. *Glumes* subequal and similar, more or less coriaceous. *Lemmas* hyaline; the lower empty, without palea; the upper shorter, entire or 2-toothed, with a stout geniculate awn; palea short, containing a bisexual floret. *Lodicules* 2, cuneate, ciliate. *Stamens* 3. *Styles* 2, free. *Grain* oblong to obovoid-oblong, free; embryo half as long.

CLEISTACHNE STOCKII, Hook. f.; F. B. I. vii. 162.

Bababudan Hills (Law); Travancore at Santhapara, 4,000 ft. (Meebold).

Culms up to 4 ft. high; leaves 10—16 in. long, 2—3 in. wide, more or less soft-hairy, margins spinulose; panicles 6—10 in.

long, rhachis and pedicels slender, rufous-hairy; glumes 15—18 in. long, dark-brown, rufous-hairy; awns 5—1 in. long.

8. *Saccharum*, Linn.

Erect, perennial, tall or very tall herbs; culms usually solid. *Leaves* narrow, flat, sometimes rolled up when dry. *Inflorescence* of large terminal panicles of racemes, often very silky and showy; rhachis articulate and fragile. *Spikelets* usually surrounded by long silky hairs from their bases, 2-nate, one pedicelled and falling from the pedicel, the other sessile and falling with the joints of the rhachis; florets 2. *Glumes* 2, equal, often subcoriaceous or chartaceous below, membranous to hyaline upwards. *Lemmas* hyaline; the lower empty; the upper sometimes awned, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free or shortly connate. *Grain* oblong to subglobose; embryo half as long or shorter.

Callus-hairs at least twice as long as the spikelets; glumes glabrous on the back; lemmas not cuspidate:—

Glumes uniform, whitish throughout, 12—15 in. long. Culms up to 20 ft. high; leaves up to 5 ft. long and 2 in. wide; panicles up to 3 ft. long, densely silvery.....1. *officinatum*.

Glumes coriaceous and brown below, subhyaline and white in the upper $\frac{2}{3}$, 14—17 in. long. Culms up to 15 ft. high; leaves 1—4 ft. long, 2—5 in. wide; panicles up to 2 ft. long, usually rather contracted, silvery.....2. *spontanum*.

Callus-hairs much shorter than the spikelets; glumes uniformly membranous, pale or brown with darker tips, white- or yellowish-villous on the lower $\frac{2}{3}$ of the back; lemmas cuspidate:—

Leaves up to 6 ft. long, 8—2 in. wide. Culms up to 20 ft. high; panicles effuse, white villous, up to 30 in. long; joints of rhachis 18—2 in. long, pedicels shorter, both white-villous; glumes 12 in. long, acute, white-villous except the glabrous upper one of the sessile spikelets.....3. *arundinaceum*.

Leaves up to 3.5 ft. long, 1—2.5 in. wide. Culms up to 10 ft. high; panicles rather contracted, yellowish-villous, up to 16 in. long; joints of rhachis and pedicels 1—12 in. long, yellowish-villous; glumes 15—19 in. long, acuminate, yellowish-villous.....4. *ciliare*.

1. *SACCHARUM OFFICINARUM*, Linn.; F. B. I. vii. 118.

Cultivated in most Districts. The Sugar-cane.

The sap is extracted from the culms by crushing and boiled down to sugar. The residue after crushing can be utilized for paper making and for cordage. The leaves are used as fodder. Vern. *Hind.* Ukh; *Ur.* Aku; *Tel.* Cheruku; *Tam.* Karumbu; *Mal.* Karimbu; *Kan.* Khabbu.

2. *SACCHARUM SPONTANEUM*, Linn.; F. B. I. vii. 118; S. I. G. fig. 129.

In all Districts, usually near water; sea-level to 5,000 ft.

A good fodder for buffaloes; the leaves are used for thatching. Vern. *Hind.* Kans; *Tel.* Rellu gaddi.

3. *SACCHARUM ARUNDINACEUM*, Retz.; F. B. I. vii. 119.

Tinnevely District and Travancore.

The culms are used for hut walls and for screens. Vern. *Tam.* Pi Karumbu; *Kan.* Hodakai hullu.

4. *SACCHARUM CILIARE*, Anderss. *S. arundinaceum* Retz.; F. B. I. vii. 119 in part.

Ganjam District.

9. *Eriochrysis*, Beauv.

Perennial herbs. *Leaves* mostly crowded at the base, very narrow. *Inflorescence* a contracted, hairy panicle of spiciform racemes; rhachis articulate, fragile. *Spikelets* 2-nate, one sessile, the other pedicelled, differing usually slightly in size and often in sex, the pedicelled falling from its pedicel, the sessile falling with the contiguous joint of the rhachis and the pedicel. *Florets* 2, the lower reduced to an empty lemma, the upper bisexual or sometimes in the pedicelled spikelet the stamens 0 or rudimentary. *Glumes* subequal, chartaceous or coriaceous. *Lemmas* hyaline, without paleas. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* obovoid to ellipsoid-globose; embryo half as long.

ERIOCHRYSIS RANGACHARII, C. E. C. Fischer in Kew Bull. 1932, 246.

At Pykara, Nilgiri Hills; 6,000 ft. (K. Ranga Achari).

Culms wiry, 5–12 in. high; leaves very narrow, plicate or more or less expanded above with involute margins, basal up to 9 in. long and 2 in. wide, softly villous; racemes 3–4; spikelets narrowly lanceolate, 15–25 in. long, surrounded by long, dense, rufous hairs; glume-margins long rufous-ciliate; florets of both spikelets usually bisexual.

10. *Spodiopogon*, Trin.

Tall, usually perennial herbs. *Leaves* flat, often petioled. *Inflorescence* of paniced 2–3-nate spikelets; rhachis jointed. *Spikelets* usually one sessile and 1–2-pedicelled, 1–2-flowered, the lower ♂, or empty, the upper bisexual. *Glumes* subequal, membranous, sometimes aristate. *Lemmas* hyaline; lower plicate, paleate or not; upper deeply 2-fid or 2-partite with a long slender awn from the sinus, its palea short. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* free, narrowly fusiform.

SPODIOPOGON ALBIDUS, Benth.; F. B. I. vii. 108.

Mysore State; W. Coast and Ghâts; Ramandrug and Hospet in the Bellary District; up to 7,000 ft.

Culms tufted, much branched, straggling, up to 4 ft. high; leaves flaccid, acuminate, often aristate, 2–10 in. long, 4–14 in. wide, base narrowed into a petiole 4–3.5 in. long; panicle at first enclosed in a long spathaceous sheath; rhachis and pedicels more or less densely silky-hairy; glumes 22–27 in. long, sometimes aristate, more or less villous; lemmas 16–24 in. long; awns 5–8 in. long.

11. *Dimeria*, R. Br.

Slender, annular or perennial herbs. *Leaves* narrow. *Inflorescence* of terminal solitary, twin or fascicled slender spikes or, more usually, spiciform racemes; rhachis inarticulate, terete, angular or flat. *Spikelets* solitary, secund, bifarious, laterally strongly compressed, articulate on the rhachis or on a very short, rarely long, pedicel, 2-flowered. *Glumes* 2, rigid, coriaceous, chartaceous or membranous, keeled, often divaricate in flower, subequal or the upper larger, with usually hyaline margins and the keel sometimes winged. *Lemmas* shorter, hyaline; the

lower empty and without palea; the upper complicate, bifid with a slender long awn from the sinus, its palea small, containing a bisexual floret. *Lodicules* 0 or 2, minute, rarely well developed. *Stamens* 2 or 3. *Styles* 2, free. *Grain* linear, compressed, free within the lemmas.

Rhachis of raceme terete or angled; leaves sparingly ciliate; awns geniculate:—Internodes of rhachis less than half as long as the upper glume; glumes coriaceous, upper 2—3 in. long including an arista, winged all down the keel and ciliate. Culms 3—7 in. high; leaves 1—2 in. long; racemes solitary; callus .05 in. long.....1. *avenacea*.

Internodes more than half as long as the upper glume; glumes chartaceous, not winged; callus very short:—

Racemes 2, rarely 3 or 1, .9—1.6 in. long. Culms very slender, 5—8 in. high; leaves 1 in. long; glumes subequal, about .13 in. long; upper lemma .11 in. long; awn .28 in. long.....2. *Hohenackeri*.

Racemes 3—5 or more, 3—5 in. long. Culms 2—3 ft. high; leaves 2—6 in. long; lower glume .14—26 in. long, acuminate, upper .15—28 in. long; upper lemma .13—21 in. long; awn .3—45 in. long.....3. *gracilis*.

Rhachis of raceme flat, sometimes keeled on one face:—

Awns geniculate:—

Glumes not winged or upper sometimes narrowly so at apex only:—

Culms slender or very slender; leaves and sheaths glabrous or sparingly hairy, not villous, .1 in. wide; glumes membranous:—

Margins of rhachis ciliate. Culms 2—20 in. high; leaves 1—2 in. long; sparingly ciliate; racemes solitary or twin, .7—2.5 in. long; glumes ciliate, lower .1—17 in. long, upper .11—2 in. long, often narrowly winged at apex; upper lemma .07—0.9 in. long; awn .28—4 in. long.....4. *Thwaitesii*.

Margins of rhachis glabrous or asperulous; leaves more or less hairy; racemes 2- or 3-nate, .7—2 in. long; glumes not ciliate or the upper at the apex only:—

Rhachis .03 in. wide. Culms 2—10 in. high; leaves 1—3 in. long; lower glume .08—1 in. long, upper .1—2 in. long; upper lemma .07—0.8 in. long; awn .3—4 in. long.....5. *ornithopoda*.

Rhachis very slender. Culms 4—14 in. high; leaves 1—1.5 in. long; lower glume .06—0.7 in. long, upper .07—0.8 in. long; upper lemma .05—0.66 in. long; awn .23—3 in. long.....6. *tenera*.

Culms comparatively robust, up to 2 ft. high; leaves and sheaths usually densely villous, 3—6 in. long, .2 in. wide; racemes usually 2, 2.5—3.5 in. long; rhachis .03—0.5 in. wide, its margins villous; glumes chartaceous, villous, lower .15—1.8 in. long, upper .18—2 in. long, apex sometimes narrowly winged; upper lemma .1—1.4 in. long; awn .3—4 in. long.....7. *pubescens*.

Upper glume distinctly winged, wing corky:—

Racemes usually solitary, .7—1.3 in. long. Culms 2—8 in. high; leaves 1—2 in. long; margins of rhachis ciliate; lower glume .17 in. long, not winged, upper .18—22 in. long, keel narrowly winged throughout and ciliate; upper lemma .12—1.3 in. long; awn .36—45 in. long.....8. *Lawsoni*.

Racemes 2- or 3-nate, .5—1.2 in. long. Culms 7—14 in. high; leaves 2—3 in. long; rhachis glabrous; lower glume .12—1.6 in. long, its keel narrowly winged throughout, upper .13—1.7 in. long, its keel broadly winged and ciliate; upper lemma .1—1.5 in. long; awn .35—42 in. long.....9. *bialata*.

Awns not geniculate, .3—3.3 in. long. Culms 10—18 in. high; leaves 2—6.5 in. long, glabrous or nearly so; racemes 2- or 3-nate, 2—5 in. long; lower glume .1—1.2 in. long, obtuse, upper .13—1.5 in. long, ciliate, sometimes narrowly winged at apex; upper lemma .1—1.2 in. long.....10. *Lehmanni*.

1. DIMERIA AVENACEA, C. E. C. Fischer, n. comb. *D. pusilla*, Thw.; F. B. I. vii. 103.

Mahendragiri, Ganjam District (Fischer); Kambakkam, Nellore District (Bourne); Tranquebar (Koenig *fide* Retzius).

2. DIMERIA HOHENACKERI, Hochst.; F. B. I. vii. 103.

Mangalore (Hohenacker).

In rice fields.

3. *DIMERIA GRACILIS*, Nees; F. B. I. vii. 105.
S. Kanara District.
4. *DIMERIA THWAITESII*, Hack. *D. pusilla*, Thw. var. *pallida*, Thw.;
F. B. I. vii. 103.
W. Coast; Madras; Travancore; sea-level to 3,000 ft.
In rice fields.
5. *DIMERIA ORNITHOPODA*, Trin.; F. B. I. vii. 104 *in part*.
Mysore State, 2,000—3,000 ft. (Meebold); Malabar; Travancore.
6. *DIMERIA TENERA*, Trin. *D. ornithopoda*, F. B. I. vii. 104 *in part*.
Godavari District at Bison Hill (Barber); S. Kanara and Malabar Districts; Bababudan, Mysore, Nilgiri and Travancore Hills; from sea-level to 5,000 ft.
7. *DIMERIA PUBESCENS*, Hack.; F. B. I. vii. 105.
Mysore State, 3,000—3,500 ft. (Meebold).
In wet localities.
8. *DIMERIA LAWSONI*, C. E. C. Fischer n. comb. *D. pusilla*, Thw.
var. *Lawsoni*, Hook. f.; F. B. I. vii. 103.
Mysore (Meebold); Coorg (Lawrie); Wynaad (Lawson); 2,000—3,000 ft.
On granite rocks (Meebold).
9. *DIMERIA BIALATA*, C. E. C. Fischer in Kew Bull., 1933, 351.
S. Kanara District at Siradi (Meebold).
10. *DIMERIA LEHMANNI*, Hack.; F. B. I. vii. 104.
Kambakkam Hills (Bourne).

12. *Pogonatherum*, Beauv.

Slender annual or perennial erect herbs. *Culms* branching, leafy. *Leaves* flat, narrow, suberect. *Racemes* terminal, solitary; rhachis fragile. *Spikelets* 2-nate, one sessile the other pedicelled, 1—2-flowered; callus bearded with fine hairs. *Glumes* membranous; lower truncate, rounded on the back; upper usually longer, keeled, 2-fid with a long slender awn from the sinus. *Lemmas* hyaline; lower usually absent from the pedicelled spikelet; upper 2-fid, with a slender awn from the sinus, its palea broad, containing a bisexual floret. *Lodicules* 0. *Stamens* 1—2. *Styles* 2, free, short. *Grain* oblong, free; embryo $\frac{2}{3}$ as long.

POGONATHERUM PANICEUM, Hack. *P. saccharoideum*, Beauv.; F. B. I. vii. 141.

Godavari District; Mysore State at 2,000 ft. (Meebold); W. Coast and Ghâts; up to 6,000 ft.

Culms 2—12 in. high, tufted; *leaves* .8—2 in. long, .05—1 in. wide; *racemes* .5—1.3 in. long; rhachis subtrigonal, joints and flat pedicels .03—0.05 in. long, long-ciliate; hairs of callus white, .1—1.8 in. long; *glumes* .04—0.09 in. long; *lemmas* .03—0.07 in. long; *awns* .5—1 in. long.

13. *Eulalia*, Kunth

Annual or more often perennial, erect herbs. *Leaves* narrow. *Inflorescence* of digitate or fascicled, rarely solitary, spiciform racemes; rhachis readily disarticulating; joints and pedicels long-ciliate. *Spikelets*

2-nate, similar, one pedicelled, the other sessile. *Glumes* 2, subequal, membranous or chartaceous; lower dorsally flat or depressed with inflexed, more or less keeled margins; upper usually boat-shaped, 1-keeled. *Lemmas* hyaline, dissimilar; lower ♂ or empty, sometimes suppressed, rarely with a palea; upper usually much shorter, rarely entire, usually 2-fid, often deeply so, with a long awn from the sinus, usually without palea, enclosing a bisexual floret. *Lodicules* 2. *Stamens* usually 3. *Styles* 2, free. *Grain* oblong or obovate-oblong; embryo $\frac{1}{2}$ — $\frac{2}{3}$ as long.

Leaves flat, acute, 3—9 in. long, .2—45 in. wide. Culms 2—3 ft. high; racemes 4—8, 2—6 in. long; joints and pedicels .14—16 in. long; glumes .21—24 in. long, lower 4-nerved, at least in the pedicelled spikelet; upper lemma .1—15 in. long, its awn .44—63 in. long.....1. *quadrinervis* var. *Wightii*. Leaves usually convolute, finely acuminate, up to 16 in. long, .1—25 in. wide; lower glume nerveless or 2-nerved:—

Hairs of the racemes white. Culms 9—43 in. high, quite glabrous; lower sheaths glabrous; racemes 2—17, rarely 1, 1.5—8 in. long; joints and pedicels .08—11 in. long; glumes .1—16 in. long; upper lemma .06—1 in. long, hardly wider than its awn; awn .38—54 in. long.....2. *tristachya*. Hairs of the racemes usually reddish-brown, rarely greyish; culms 10—52 in. high, densely white- or brown-silky for a short distance below the inflorescence; lower sheaths usually red-brown tomentose at the base; racemes 2—11, 1—5.5 in. long; joints and pedicels .1—16 in. long; upper lemma .1—17 in. long, decidedly wider than its awn; awn .5—8 in. long.....3. *phaeothrix*.

1. *EULALIA QUADRINERVIS*, O. Kt.

Var. *Wightii*, Hook. f. *Pollinia quadrinervis*, Hack. var. *Wightii*, Hook. f.; F. B. I. vii. 110.

Rampa Hills at 4,500 ft. (Narayanswami); Pulney Hills; 6,000—7,000 ft. (Wight, Bourne).

2. *EULALIA TRISTACHYA*, O. Kt. *Pollinia argentea*, Trin.; F. B. I. vii. 111.

W. Coast and Ghâts; Kambakkam Hills; sea-level to 5,000 ft.

A good fodder when young.

3. *EULALIA PHAEOTHRIX*, O. Kt. *Pollinia phaeothrix*, Hack.; F. B. I. vii. 112.

Rampa Hills (Narayanswami); N. Coimbatore and Sirumalai Hills; W. Ghâts; 3,000—8,800 ft.

Very common in open downs at high elevations.

14. *Pseudopogonatherum*, A. Camus

Annual erect herbs. *Leaves* very narrow, often inrolled. *Inflorescence* of few to many spiciform racemes approximate on a common, persistent axis. *Spikelets* 2-nate, both pedicelled and falling from the pedicels or less often one of them sessile and falling with the pedicel of the other. *Glumes* chartaceous or membranous, lower rounded or flat on the back with inflexed margins, upper often aristate or mucronate. *Lemmas* hyaline, lower ♂, empty or sometimes suppressed, upper narrow, often bifid, with a long awn. *Lodicules* 2. *Stamens* usually 3. *Style* 2, free. *Grain* oblong or obovate-oblong; embryo $\frac{1}{2}$ — $\frac{2}{3}$ as long.

PSEUDOPOGONATHERUM CONTORTUM, A. Camus. *Pollinia articulata*, Trin.; F. B. I. vii. 109.

Goomsur in Ganjam District (Gamble); Kodagundi Reserved Forest in Vizagapatam District (Jacob).

Culms up to 3·5 ft. high; leaves 4—10 in. long, ·05—·07 in. wide; racemes 4—13, 1—2·5 in. long, rhachis and pedicels white-hairy; both spikelets pedicelled; lower glume ·08—·09 in. long, ciliate, upper with a capillary awn ·12—·17 in. long; awn of upper lemma geniculate, ·7—·8 in. long.

15. *Microstegium*, Nees

Annual or perennial, erect or decumbent herbs. *Leaves* flat, narrowed to the base and often petioled. *Inflorescence* of fascicled, spiciform racemes; rhachis readily disarticulating; joints and pedicels usually long-ciliate. *Spikelets* 2-nate, one sessile, the other pedicelled, similar. *Glumes* membranous or chartaceous, the lower dorsally longitudinally channelled, with more or less keeled margins, upper boat-shaped, medially keeled. *Lemmas* hyaline, lower ♂ or empty, rarely paleate, sometimes absent, upper much shorter, 2-fid with a long awn from the sinus, usually without palea. *Lodicules* 2. *Stamens* 1, 2 or 3. *Styles* 2, free. *Grain* oblong or obovate-oblong.

Racemes 2—10, fascicled, 1·5—3 in. long; margins of joints and pedicels densely ciliate; callus shortly bearded. Culms up to 4 ft. high; leaves sometimes shortly petioled, 1—4·5 in. long, ·2—·5 in. wide; glumes of sessile spikelet ·14—·15 in. long; awns very slender, ·2—·4 in. long.....1. *ciliatum*. Racemes 3—6, somewhat distant, 1—4 in. long; joints and pedicels slender, glabrous or slightly ciliate at the base only; callus not bearded, Culms up to 5 ft. high; leaves 1—2 in. long, ·3—·5 in. wide; glumes of sessile spikelet ·15—·18 in. long; awns capillary ·5—·7 in. long.....2. *nudum*.

1. *MICROSTEGIUM CILIATUM*, A. Camus. *Pollinia ciliata*, Trin.; F. B. I. vii. 116.

Pulney and Travancore Hills; 6,000 ft.

2. *MICROSTEGIUM NUDUM*, A. Camus. *Pollinia nuda*, Trin.; F. B. I. vii. 117.

Pulney Hills; 5,000—7,000 ft.

16. *Pollinidium*, Stapf ex Haines

Densely tufted perennial herbs; rootstock and basal sheaths woolly. *Leaves* convolute, wiry. *Inflorescence* of more or less paniced, digitate or fascicled, spiciform racemes; rhachis compressed, articulated, fragile. *Spikelets* 2-nate, one sessile, the other pedicelled, similar; callus densely clothed with long brown hairs. *Glumes* 2; lower flattened, 2—3-toothed, 5—7-nerved, margins inflexed, hairy on the back at the base; the upper cymbiform, cuspidate or aristate, 3—5-nerved. *Lemmas* hyaline; lower elliptic, its palea finely ciliate; upper narrow, conduplicate, entire or 2-toothed, finely awned from the tip or the sinus, its palea broad, nearly as long, densely ciliate at the apex. Other characters as in *Ischaemum*.

POLLINIDIUM BINATUM, C. E. Hubbard. *Ischaemum angustifolium*, Hack.; F. B. I. vii. 129.

Ganjam, Vizagapatam and Godavari Districts.

Culms 1—3 ft. high; leaves up to 3 ft. long and ·16 in. wide; the old sheaths white-woolly at the base; racemes 1—4, 1—2 in. long; joints slender, ·12—·16 in. long, glabrous or with a line

of hairs, densely rusty- or golden-villous at the base, pedicels similar, shorter; lower glumes chartaceous, 13—16 in long; upper lemmas 13—15 in. long; awns 16—28 in. long.

Used for paper-making and locally for fibre, cordage and mats. Eaten by cattle when young. Vern. *Hind.* Bhabar, Sabai; *Ur.* Babuli.

17. *Ischaemum*, Linn.

Usually perennial. *Leaves* convolute when young, eventually flat, usually narrow, sometimes petioled. *Inflorescence* of twin, digitate, fascicled or corymbose spiciform racemes; rhachis compressed, readily disarticulating; joints and pedicels flattened or subconcave on the inner side, often stout. *Spikelets* 2-nate, one sessile or with a short pedicel and falling with the contiguous joint, the other long-pedicelled and falling from the pedicel, the pairs alike or differing only in sex or more or less heteromorphous; florets 2, generally the lower ♂, the upper bisexual, rarely ♂ or empty in the long pedicelled spikelet. *Glumes* subequal, lower flattened or somewhat convex, rarely concave on the back, coriaceous below, chartaceous and sometimes strongly nerved towards the apex, seldom chartaceous throughout, entire or 2-fid and cuspidate, with more or less keeled, inflexed margins; upper glume boat-shaped, medially keeled at least towards the apex, sometimes awned. *Lemmas* hyaline to rigidly membranous; lower muticous; upper of sessile spikelet usually 2-fid and geniculately awned from the sinus, rarely mucronate or muticous; that of the long-pedicelled spikelet sometimes similar but more often entire and awnless; the paleas hyaline, subequal to the lemmas. *Lodicules* 2. *Stamens* 3, sometimes small or rudimentary in the fertile florets. *Styles* 2, free. *Grain* oblong or lanceolate, dorsally compressed; embryo about half as long.

Sessile spikelets, at least, awned:—

Margins of lower glume of sessile spikelets expanded below the middle, incurved at the base, apex 2-toothed or -cuspidate; upper lemmas of both spikelets 2-lobed to about the middle with an awn from the sinus:—

Racemes 2, rarely 3:—

Lower glume of sessile spikelet distinctly winged at apex, 15—18 in. long, upper glume and lower pedicelled spikelet 1-keeled and winged at the apex. Culms often creeping at the base, 2—30 in. high; leaves rounded or narrowed at the base, sessile, 1.5—9.5 in. long, .05—5 in. wide, sparsely to densely hairy; awns 3—5 in. long.....1. *aristatum*.

Lower glume of sessile spikelets not winged. Culms slender, up to 3 ft. high:—

Lower leaves, at least, acute at base, hairy, 1—3.2 in. long, .2—5 in. wide, often narrowed into a rather broad petiole up to .75 in. long; racemes .8—2.5 in. long; rhachis distinctly undulate; lower glume of sessile spikelets 13—18 in. long, ribbed at the apex, more or less hirsute, upper glume minutely 2-lobed, mucronate or cuspidate, keeled upwards, not winged; awns of sessile spikelets 28—54 in. long, of pedicelled shorter and finer.....2. *timorense*.

Leaves rounded or attenuate at base, 2—4 in. long, .15—2.5 in. wide, glabrous or with a few ciliae, sometimes the lowest tapering into a petiole up to 1 in. long; racemes 1—2 in. long; rhachis nearly straight; lower glume of sessile spikelets 14—26 in. long, strongly nerved at apex, bristly in the middle or hirsute below the middle, upper glume keeled and narrowly winged upwards, with a tuft of hairs below the wing, apex

minutely 2-toothed with an arista .1—28 in. long; awns of both spikelets .4—1 in. long.....3. *Thomsonianum*.
 Racemes corymbose, 7—12, rarely as few as 3 or up to 16, 1.5—3.5 in. long, silvery hirsute. Culms robust, rooting below, up to 24 in. high; leaves sessile, usually narrowed at base, sometimes rounded, 2.5—9.5 in long, .2—7.5 in. wide, softly hairy, rarely glabrous; lower glume of sessile spikelets not winged; awns of both spikelets .3—4.5 in. long.....4. *nilagiricum*.

Margins of glumes narrowly inflexed, not expanded below; lower glume of pedicelled spikelets flat, 2-keeled:—

Lower glume, at least, of pedicelled spikelet, winged, its upper lemma entire, awnless; Racemes 2—3, rarely 1:—

Lower glume of sessile spikelets .34—36 in. long with 3—4 nodules on each margin in the lower part, sometimes connected by rounded transverse ridges, keels narrowly winged. Whole plant glabrous; culms robust; leaves rounded or emarginate at the base, sessile, up to 15 in. long and 1.3 in. wide; racemes 3, up to 4.3 in. long; joints .1 in. wide; lower glume of pedicelled spikelets smooth, with a wide wing on one keel; lemmas brown, awn of sessile spikelets .36 in. long.....5. *Koenigii*.

Lower glume of sessile spikelets .16—28 in. long; rhachis of racemes, at least, hairy:—

Pedicels usually more than $\frac{1}{2}$ as long as the sessile spikelets, rarely only $\frac{1}{4}$. Culms slender, erect, 5—36 in. high; leaves rounded or emarginate at base and sessile or narrowed into a petiole up to 2 in. long, more or less hairy, .8—6 in. long, .12—7 in. wide; racemes 1—2.8 in. long; lower glume of sessile spikelets smooth or with 1—3 shallow marginal nodules usually joined by shallow curved, transverse ridges, keels narrowly winged above, glabrous, lower glume of pedicelled spikelets smooth, one keel widely winged, the other wingless or very narrowly winged at apex; awn .3—5.4 in. long.....6. *commutatum*.

Pedicels less than half as long as the sessile spikelet:—

Leaves, at least the lower, cordate or sagittate at base:—

Pedicels and joints plano-convex, ciliate to densely villous; lower glume of sessile spikelets with 3—6 marginal nodules below the middle, usually connected by transverse ridges, sometimes smooth, keels usually narrowly winged at apex:—

Leaves, at least some, petioled, base deeply cordate to acutely sagittate, .8—3.5 in. long, .2—5 in. wide. Culms slender, often decumbent at base, up to 20 in. high; racemes 1—2 in. long; lower glume of sessile spikelets narrowly lanceolate, transverse ridges usually irregular and shallow, rarely regular and deep; lower glume of pedicelled spikelets similar but more often smooth or the nodules and ridges more shallow and one keel broadly winged; awn .42—9 in. long.....7. *semisagittatum*.

Leaves all sessile, shallowly cordate, 2—6.5 in. long, .15—4 in. wide. Culms rather stout, up to 36 in. high; racemes 2—4.6 in. long; lower glume of sessile spikelets ovate- or lanceolate-oblong; lower glume of pedicelled spikelets smooth or sometimes faintly noded, one keel with a wide crescent-shaped wing; awn .4—76 in. long.....8. *molle*.

Pedicels and joints acutely trigonous, outer angle long-ciliate. Culms erect from a prostrate base, 10—16 in. high; leaves more or less cordate at base, sessile or petioled, .8—3.4 in. long, .12—4 in wide, petioles up to 1 in. long; racemes 1—2.8 in. long; lower glume of sessile spikelets obliquely linear-lanceolate, margins in basal $\frac{2}{3}$ with 2—5 horny, large almost keeled nodules, quite smooth between the margins, in the apical $\frac{1}{3}$ one keel broadly, the other narrowly winged; lower glume of pedicelled spikelets similar but smooth; upper lemma of sessile spikelets usually 2-lobed to below the middle, its awn .4—68 in. long, that of the pedicelled spikelet tapered into a fine arista .1—15 in. long.....9. *Rangacharianum*.

Leaves not cordate or sagittate:—

Lower glume of sessile spikelets with 5 horny, usually sharp, deep, regular, seldom irregular, transverse ridges in the lower part, the

keels unequally winged in the upper part. Culms stout, 12—45 in. high; leaves tapered to an acute base, 6—13 in. long, .15—.4 in. wide; racemes 1—3.2 in. long; joints and pedicels plano-convex, stout, outer margin hairy; lower glumes of pedicelled spikelets smooth or more or less ridged, one keel with a wide crescent-shaped wing; lemma of sessile spikelet 2-lobed to below the middle; awn .5—8 in. long.

10. *rugosum*.

Lower glume of sessile spikelets with marginal nodules not extended across the glume or if meeting the ridges very shallow and irregular; lower glume of pedicelled spikelets with one broad and one narrow wing. Culms rather stout, up to 3 ft. high:—

Lower glume of sessile spikelets not or very narrowly winged at apex, below with 2—6 rounded marginal nodules sometimes joined by shallow irregular transverse ridges. Leaves 2.5—6 in. long, .4—.65 in. wide, base rounded, sometimes with a short tomentose petiole; racemes 2.5—4.5 in. long; joints and pedicels obtusely trigonous, glabrous or sparsely hairy on the back; lower glume of pedicelled spikelets oblong, smooth or rugulose; awn up to .62 in. long, sometimes short or even absent.....11. *travancorensis*.

Lower glume of sessile spikelets oblique, the basal $\frac{2}{3}$ with 2—5 marginal nodules, smooth between the margins, one keel broadly the other narrowly winged at apex. Leaves tapering to the base, 1.5—9.5 in. long, .1—2.5 in. wide; racemes 1.5—4 in. long; joints and pedicels acutely trigonous, up to .1 in. wide, one angle hairy; lower glume of pedicelled spikelets lanceolate, smooth; awn .23—.52 in. long.....12. *mangaluricum*.

Glumes not winged. Rhizome stoloniferous; culms erect, up to 4 ft. high; leaves 2—14 in. long, .15—.33 in. wide; racemes 3—6, rarely only 2, 3—8 in. long; joints and pedicels subclavate, compressed, yellow- or brownish-pilose; lower glumes of both spikelets narrowly lanceolate; awn slender, .3 in. long; upper lemma of pedicelled spikelets shortly 2-lobed, with a slender arista .1—.2 in. long.....13. *pilosum*.

Both spikelets awnless. Rhizome creeping, stout; culms erect, slender, 7—20 in. high; leaves 1—5.4 in. long, .15—.5 in. wide, base rounded or shallowly cordate, sometimes very shortly petioled; racemes 2, .9—1.5 in. long; joints and pedicels stout, sharply trigonous, more or less ciliate; lower glumes of both spikelets smooth, shining, .25 in. long, narrowly winged at apex; lemma of sessile spikelet shortly 2-lobed, usually with a mucro.....14. *muticum*.

1. *ISCHAEMUM ARISTATUM*, Linn. *I. ciliare*, Retz.; F. B. I. vii. 133; S. I. G. figs. 135, 136.

Common in all Districts; sea-level to 8,000 ft.

Vern. *Tel.* Erruthota gaddi; *Kan.* Mobbu ganjalu garikai hullu.

Var. *Barberi*, C. E. C. Fischer n. var. More robust, nearly glabrous, more coriaceous; lower glume of sessile spikelet with wide ear-shaped wings at apex; upper lemma of pedicelled spikelets with a slender arista .1—.2 in. long.

Mangalore (Barber No. 4803).

2. *ISCHAEMUM TIMORENSE*, Kunth; F. B. I. vii. 136.

W. slopes of Nilgiris; N. Coimbatore Hills; W. Coast in Malabar and Travancore; up to 3,000 ft.

Vern. *Kan.* Nilamunga hullu.

Var. *villosum*, C. E. C. Fischer n. var. Joints of rhachis, pedicels and lower glume of sessile spikelets densely villous.

3. *ISCHAEMUM THOMSONIANUM*, Stapf MS., n. nom. *I. murinum*, Hook. f. non Forst.; F. B. I. vii. 135.

Mysore; Cochin; Travancore; up to 3,000 ft.

4. *ISCHAEMUM NILAGIRICUM*, Hack. *I. hirtum*, Hook. f. non Hack.; F. B. I. vii. 135 *in part*.
Kistna (Barber) and Salem Districts; Nilgiri and Pulney Hills; up to 6,500 ft.
5. *ISCHAEMUM KOENIGII*, Stapf MS. n. comb. *I. aristatum*, Hook. f. non Linn. subsp. *Koenigii*, Hook. f.; F. B. I. vii. 127.
Precise locality unknown (Koenig).
6. *ISCHAEMUM COMMUTATUM*, Hack.; F. B. I. vii. 131.
W. Ghâts, 2,000—7,000 ft.
7. *ISCHAEMUM SEMISAGITTATUM*, Roxb.; F. B. I. vii. 130. *I. conjugatum*, Roxb.; F. B. I. vii. 131.
W. Coast and Ghâts; up to 4,000 ft.
8. *ISCHAEMUM MOLLE*, Hook. f.; F. B. I. vii. 128.
Mysore State, 2,000—3,500 ft. (Meebold); W. Coast, near sea-level.
9. *ISCHAEMUM RANGACHARIANUM*, C. E. C. Fischer in Kew Bull., 1933, 352; *I. aristatum*, Ranga Achariar et Tadulingam non Linn.; S. I. G. fig. 130.
Malabar and Travancore; at low elevations.
10. *ISCHAEMUM RUGOSUM*, Salisb.; F. B. I. vii. 127; S. I. G. fig. 132.
In all Districts; up to 6,000 ft.
Eaten when young by horses and cattle; grain occasionally eaten by the poor. Vern. *Tam.* Kadukken pillu.
11. *ISCHAEMUM TRAVANCORENSE*, Stapf ex C. E. C. Fischer in Kew Bull., 1933, 353.
Wynaad and Travancore.
12. *ISCHAEMUM MANGALURICUM*, Stapf MS. n. comb. *I. aristatum*, Hook. f. non Linn. var. *mangaluricum*, Hack.; F. B. I. vii. 127; S. I. G. fig. 131.
Mysore State (Meebold); S. Kanara and Malabar Districts; up to 2,000 ft.
13. *ISCHAEMUM PILOSUM*, Hack.; F. B. I. vii. 130; S. I. G. figs. 133, 134.
Deccan.
A moderate fodder. Vern. *Tel.* Kundara gaddi, Urranki.
14. *ISCHAEMUM MUTICUM*, Linn.; F. B. I. vii. 132.
S. Kanara and Travancore.
Usually growing in water; also among coastal sands.

18. *Sehima*, Forsk.

Annual or perennial erect, tufted herbs. *Leaves* convolute when young, later expanded. *Racemes* solitary, often much curved; rachis jointed, fragile; joints and pedicels plano-convex. *Spikelets* compressed, 2-nate, one sessile, the other pedicelled; 2-flowered; lower floret ♂, upper bisexual in the sessile spikelet, ♂ or neuter in the pedicelled. *Glumes* subequal, usually chartaceous; lower of sessile spikelets usually deeply grooved, rarely flat, 2-toothed or -cuspidate, keeled upwards and often winged on the keels; upper boat-shaped, often aristate. *Lemmas* hyaline; the lower entire and muticous; the upper 2-fid with a geniculate awn from the sinus. *Lodicules* 2. *Stamens* 3. *Grain* oblong, obtusely trigonous; embryo half as long.

Joints and pedicels .14—.18 in. long, ciliate on both edges; lower glume of sessile spikelets .25—.28 in. long, strongly 4-nerved, the 2 median branched, diverging and converging again with a deep depression between; callus .04—.05 in. long; upper glume .21—.26 in. long, entire, keel narrowly winged at the apex, with a setaceous arista .43—.6 in. long; awns 1.2—1.6 in. long. Culms up to 4 ft. high; leaves 3—20 in. long, .1—3 in. wide.....1. *nervosum*.
 Joints and pedicels .18—.26 in. long, ciliate on one margin only; lower glume of sessile spikelets .28—.34 in. long, strongly 4-nerved, the 2 median straight, close together with a groove between; callus .05—.08 in. long; upper glume .23—.27 in. long, 2-cuspidate, not winged, with a setaceous arista .36 in. long; awns 1—1.8 in. long. Culms weak, up to 2 ft. high; leaves 3.5—6 in. long, .1—.2 in. wide.....2. *sulcatum*.

1. SEHIMA NERVOSUM, Stapf. *Ischaemum laxum*, R. Br.; F. B. I. vii. 136; S. I. G. fig. 137.

In all Districts except the W. Coast; sea-level to 6,000 ft.

A good fodder. Vern. *Hind.* Chota shadai ghans; *Tam.* Kura itti; *Kan.* Sinna shadai hullu, Nalai hullu.

2. SEHIMA SULCATUM, A. Camus. *Ischaemum sulcatum*, Hack.; F. B. I. vii. 137.

Nellore and Kistna Districts (Bourne).

19. Lophopogon, Hackel

Small, perennial, densely tufted herbs. *Leaves* very narrow. *Inflorescence* of terminal, solitary, binate or fascicled, spiciform racemes; rhachis articulate, more or less fragile; joints often cupular at the tip. *Spikelets* 1—2-flowered, 2-nate, one sessile the other pedicelled. *Sessile spikelet* with a short callus, dorsally compressed. *Glumes* chartaceous; the lower truncate, irregularly toothed; the upper longer, acute, apiculate or narrowed into a straight awn. *Lemmas* hyaline; the lower with a linear palea and empty or ♂ with 1—2 stamens; upper often 2-fid with setiform lobes, often aristate from the sinus, its palea quadrate, containing a bisexual or ♂ floret with 2 anthers. *Lodicules* 0. *Pedicelled spikelet* laterally compressed or nearly terete, 2-flowered, the lower floret often ♂, the upper ♀.

LOPHOPOGON TRIDENTATUS, Hack.; F. B. I. vii. 149; S. I. G. fig. 141.

Cuddapah, Nellore, Chittoor and Chingleput Districts; Mysore State; sea-level to 2,000 ft.; usually in dry localities.

Culms very slender, capillary at apex, often densely white-silky at the base, 3—20 in. high; leaves 1—6 in. long; racemes usually 2, .3—.9 in. long; lower glumes narrowly obcuneate, 3-toothed or mucronate and lobulate, with a tuft of rufous hairs in the middle, .17—.19 in. long; upper glume narrowly boat-shaped, .18—.22 in. long, narrowed to a fine arista .25—.4 in. long, margins with long rufous hairs; awns .6—.9 in. long.

20. Apocypis, Nees

Annual or perennial herbs. *Leaves* flat. *Racemes* terminal, solitary or 2—3-nate; rhachis not readily disarticulating. *Spikelets* secund, closely imbricate, compressed, solitary, sessile, often accompanied by a pedicel without spikelet. *Glumes* 2, chartaceous or membranous; lower broadly cuneiform, nearly flat, truncate, rounded or emarginate;

upper narrower, usually laterally 2-keeled with broadly inflexed margins. *Lemmas* hyaline; lower oblong, its palea nearly as long, enclosing a ♂ floret or empty; upper very narrow, entire or shortly 2-lobed with a long geniculate awn, its palea much shorter, wrapped round a ♀ or bisexual floret. *Lodicules* 0. *Stamens* 2 or 3. *Styles* 2, free. *Grain* linear or fusiform; embryo half as long.

APOCOPIS WIGHTII, Nees; F. B. I. vii. 142; S. I. G. figs. 139, 140.

In all Districts, except in the driest localities; sea-level to 3,000 ft.

Culms often densely tufted, 2·5–24 in. high; leaves densely imbricate or distant, ·5–5 in. long, ·05–·25 in. wide, more or less hairy from bulbous bases; racemes usually 2, ·5–1·7 in. long, rhachis and pedicels rufous-hairy; lower glume obcordate or obovate truncate, yellow with a red-brown tip or dark-brown with a yellowish tip, glabrous to densely rufous- or fuscous-hairy, ·14–2 in. long; awn geniculate, ·75 in. long.

21. *Eremochloa*, Buesé

Perennial herbs. *Leaves* more or less equitant, rigid, flat. *Inflorescence* a terminal, solitary, spiciform raceme; rhachis articulated, fragile. *Spikelets* secund, solitary owing to the pedicelled spikelets being reduced to a rudimentary pedicel, sessile, imbricating, dorsally compressed, 2-flowered. *Glumes* chartaceous or coriaceous; lower nearly flat, oblong to subcircular, 2-keeled, the margins pectinate with long spinules or rigid hairs, often winged at the apex; upper elliptic or oblong-lanceolate, 3–5-nerved. *Lemmas* hyaline, muticous, paleate; lower ♂; upper smaller ♀ or bisexual. *Lodicules* 2. *Stamens* 3. *Grain* elliptic or ovoid, flattened on one side; embryo half as long.

EREMOCHLOA MURICATA, Hack.; F. B. I. vii. 140; S. I. G. fig. 138.

Chingleput and S. Arcot Districts.

Culms 5–24 in. high; leaves densely tufted below, ·15–·27 in. wide, exactly linear, sometimes with a few ciliae near the rounded base; raceme 2·5–4·5 in. long; lower glume thickly coriaceous, broadly ovate, acute, the upcurved marginal spinules up to ·07 in. long, apex with a broad triangular or fan-shaped wing on both sides, wider across than the width of the rest of the glume.

22. *Arthraxon*, Beauv.

Annual or perennial, sometimes decumbent herbs. *Leaves* linear-lanceolate to ovate, base usually cordate or amplexicaul, margins more or less ciliate from bulbous bases. *Inflorescence* of twin, digitate, fascicled or subpanicled simple or branched racemes or spikes; rhachis articulated, fragile. *Spikelets* laterally compressed, 2-nate, one sessile, the other pedicelled, similar or differing in sex mainly owing to reduction, or else solitary and sessile with or without an often very rudimentary pedicel. *Glumes* equal, chartaceous to coriaceous, rarely membranous; lower 2-keeled or rounded on the back and sides and not keeled, sometimes bearing rows of tubercles or spines on the margins; upper thinner, much compressed, keeled upwards, in all our species complicate-boat-shaped. *Lemmas* hyaline; lower empty, usually

without palea; upper subentire with a dorsal or basal, more or less well-developed awn, rarely awnless, enclosing a bisexual floret, palea minute or 0. *Lodicules* 2. *Stamens* 2—3. *Grain* narrowly linear or fusiform; embryo half as long. *Pedicelled spikelet*, when present, usually ♂ and awnless.

Lower glume of sessile spikelets 2-keeled, margins inflexed, back nearly flat:—

Glumes glabrous or nearly so; keels not winged:—

Keels of lower glume of sessile spikelets tubercled or toothed; pedicelled spikelets more or less developed:—

Lower glume of sessile spikelets .2 in. or less long with pectinately toothed keels; joints of rhachis .1—12 in. long, ciliate:—

Lower glume of sessile spikelets lanceolate .18—2 in. long, back smooth.

Rootstock and lowest 1 or 2 sheaths tomentose; culms comparatively robust, up to 36 in. high; leaves lanceolate to linear-lanceolate, .8—3 in. long, .12—65 in. wide, glabrous; awns .26—42 in. long.....1. *lanceolatus*.

Lower glume of sessile spikelets linear or narrowly lanceolate, .2 in. long, nerves on back echinulate, rarely in the lowest spikelets smooth. Rootstock and sheaths not tomentose; culms up to 12 in. high; leaves linear, .8—2.3 in. long, .17—5 in. wide, usually pubescent, rarely quite glabrous; awns .3—4 in. long.....2. *echinatus*.

Lower glume of sessile spikelets .28 in. or more long, narrowly linear-lanceolate, keels with a double row of tubercles, gradually converted to spinules at the apex. Culms 4—10 in. high; leaves ovate to ovate-lanceolate, .8—2.3 in. long, .25—6 in. wide, sparsely hairy; joints .18 in. long, long-ciliate; awns .8 in. long.....3. *Meeboldii*.

Lower glume of sessile spikelets linear-lanceolate, subcoriaceous, .2—26 in. long, keels spinulose-hispid. Culms comparatively robust; leaves rigid, ovate to oblong-lanceolate, cuspidate, 2—3.5 in. long, .5—1 in. wide, glabrous; joints .16—19 in. long, compressed, densely ciliate; pedicelled spikelet reduced to a pedicel; awn .42—48 in. long.....4. *depressus*.

Lower glume of sessile spikelets lanceolate, .22 in. long, back densely villous, keels with narrow, densely ciliate wings. Culms 12 in. or more long; leaves linear-lanceolate, 1.2—2 in. long, .3 in. wide, hairy; joints .14 in. long, long white-ciliate, pedicelled spikelet fully developed; awn .48 in. long.....5. *villosus*.

Lower glume of sessile spikelets compressed-convex, not keeled, margins not inflexed:—

Lower glume entire or minutely 2-toothed; no pedicelled spikelet:—

Paleas about half as long as the upper lemmas, ovate-lanceolate. Culms up to 2 ft. high; leaves linear-lanceolate, acuminate, 1.5—4 in. long, .15—6 in. wide, margins and midrib below ciliate; pedicels .09 in. long, hairy on the back, devoid of spikelets; glumes of sessile spikelets minutely muriculate, lower .2—24 in. long, 5—7-nerved, nerves armed with spinescent tubercles in the upper half, upper longer, keeled, keel spinulose near apex.....6. *rudis*.

Paleas 0:—

Joints subterete, very slender, .07—1 in. long, finely ciliate on one side only; pedicels 0. Culms very slender, 2—18 in. high; leaves linear to elliptic-lanceolate, .4—2.3 in. long, .07—55 in. wide; lower glume .1—15 in. long, nerves minutely scaberulous; upper glume minutely puberulous, not ciliate; awns .23—4 in. long.....7. *Quartinianus*.

Joints plano-convex, slender, .12—18 in. long, glabrous; pedicels .06—14 in. long, linear, flat. Culms 10—20 in. high; leaves lanceolate to ovate, .7—2.3 in. long, .2—7 in. wide; lower glume .15 in. long, nerves hispid; upper glume hispid at apex, its margins ciliate; awns .3—5 in. long

8. *hispidus*.

Lower glume of sessile spikelets lanceolate, .1—13 in. long, minutely puberulous, 2-cuspidate. Culms very slender, straggling, up to 16 in. long; leaves linear-lanceolate to ovate, .5—1.7 in. long, .15—47 in. wide, puberulous and often also sparsely hairy; joints very slender, subterete, .03—08 in. long, densely long-ciliate; pedicels .03—04 in. long flat, long-ciliate, spikelets fully developed; upper glume of sessile spikelets .08—09 in. long, with a mucro .06 in. long; awns .24—4 in. long.....9. *lanceifolius*.

1. *ARTHRAXON LANCEOLATUS*, Hochst.; F. B. I. vii. 143.
Bellary District at Raman Drug; Nilgiri and Pulney Hills;
2,500—6,500 ft.
Vern. *Tel.* Rai gaddi.
2. *ARTHRAXON ECHINATUS*, Hochst. *A. spathaceus*, Hook. f.; F. B. I.
vii. 145.
Cuddapah District (Wight, Gamble); Mysore State (Meebold);
about 2,000 ft.
3. *ARTHRAXON MEEBOLDII*, Stapf.
Mangalore (Meebold).
4. *ARTHRAXON DEPRESSUS*, Stapf ex C. E. C. Fischer in Kew Bull.
1933, 350.
Mysore State at Agalatti (Meebold); 3,500 ft.
5. *ARTHRAXON VILLOSUS*, C. E. C. Fischer in Kew Bull. 1933, 350.
Bababudan Hills (Bourne).
6. *ARTHRAXON RUDIS*, Hochst.; F. B. I. vii. 144.
Mysore State (Meebold); 3,500 ft.
7. *ARTHRAXON QUARTINIANUS*, Nash. *A. ciliaris*, Beauv. a; F. B. I.
vii. 146.
W. Gháts from Coorg to the Pulney Hills; 3,000—7,000 ft.;
Mysore State; Calicut; Bolampatti Valley at 1,700 ft. (Fischer).
Vern. *Kan.* Nela bidaru hullu.
8. *ARTHRAXON HISPIDUS*, Makino. *A. ciliaris*, Beauv. b; F. B. I. vii.
146.
Mysore State at 2,000 ft. (Meebold); Malabar (Barber); Travan-
core (Mayuranathan).
9. *ARTHRAXON LANCIFOLIUS*, Hochst. *A. microphyllus*, Hochst.; F.
B. I. vii. 147.
Rampa Hills at 4,500 ft. (Narayanaswami); Bellary District at
Raman Drug; Mysore State (Meebold); W. Coast.

23. *Capillipedium*, Stapf.

Annual or perennial herbs. *Leaves* flat. *Inflorescence* a rather delicate, usually much divided panicle; main rhachis and branches capillary; racemes 1—4, rarely up to 8-jointed; joints and pedicels slender, longitudinally grooved and translucent in the groove. *Spikelets* 2-nate, one sessile, the other pedicelled, similar in shape, differing in sex. *Sessile spikelets*: *Glumes* subequal, thinly chartaceous to membranous; lower 2-keeled with narrow, inflexed margins, keels usually bristle-ciliate; upper boat-shaped, more or less grooved on each side of the keel. *Lemmas* dissimilar; lower hyaline empty; upper reduced to the linear, hyaline base of a geniculate awn, containing a bisexual floret; palea absent. *Lodicules* 2. *Stamens* 3. *Grain* oblong, slightly dorsally compressed; embryo more than half as long. *Pedicelled spikelet* sometimes with only one 2-keeled glume, the second, if present, shorter or much reduced; one or both lemmas sometimes present, hyaline, awnless, sometimes containing a ♂ floret.

Culms stiff, erect, not or hardly decumbent below:—

Culms usually copiously branched, up to 6 ft. high, or even taller, almost woody; nodes glabrous or short-hairy; panicles usually large, lax; callus of sessile

- spikelets shortly bearded; lower glume .08—1 in. long, glabrous or minutely puberulous; awns .36—5 in. long; lower glume of pedicelled spikelets .1—16 in. long.....1. *glaucopsis*. Culms simple or sparingly branched, up to 4 ft. high, usually slender; nodes usually densely, often long bearded; panicles contracted, rarely somewhat lax; callus of sessile spikelets densely villous; lower glume .1—14 in. long, usually villous all over or only below the middle; sometimes only puberulous or quite glabrous, awns .4—9 in. long; lower glume of pedicelled spikelets .14—17 in. long.....2. *Huegelii*. Culms decumbent and often interlaced, copiously geniculately branched, weak, up to 3 ft. long; nodes shortly hairy; panicles 1—2 in. long, branches few; callus of sessile spikelets densely villous; lower glume .08—12 in. long, glabrous or sparsely hairy below the middle; awns .38—62 in. long; lower glume of both spikelets equal.....3. *filiculmis*.

1. *CAPILLIPEDIUM GLAUCOPSIS*, Stapf. *Andropogon assimilis*, Steud.; F. B. I. vii. 179.

Ganjam (Gamble) and Godavari Districts; Coorg, Wynaad and Travancore; 300—2,000 ft.

2. *CAPILLIPEDIUM HUEGELII*, Stapf. *Andropogon Huegelii*, Hack. F. B. I. vii. 180. *A. Schmidii*, Hook. f.; F. B. I. vii. 180.

W. Ghâts from the Bababudan Hills to Travancore; S. Kanara District; sea-level to 7,000 ft. Often aromatic.

3. *CAPILLIPEDIUM FILICULMIS*, Stapf. *Andropogon filiculmis*, Hook. f.; F. B. I. vii. 181.

Mysore State at Agalatti (Meebold); S. Kanara and S. Malabar Districts.

24. *Amphilophis*, Nash

Perennial herbs. *Leaves* narrow, usually flat. *Inflorescence* of paniced digitate, spiciform, shortly peduncled racemes, usually with a short primary axis, rarely with secondary branches; rhachis of raceme many-jointed, disarticulating horizontally; joints and pedicels filiform, longitudinally grooved and translucent in the groove. *Spikelets* 2-nate, one sessile, the other pedicelled, similar in shape or the pedicelled reduced, differing in sex except the lowermost pair, which may be homogamous (σ or empty). *Sessile spikelets* dorsally compressed, callus small, usually bearded. *Glumes* subequal, chartaceous or membranous; lower 2-keeled with inflexed margins; upper boat-shaped, acutely keeled. *Lemmas* dissimilar; lower hyaline, empty; upper reduced to the linear stipe of a geniculate awn, containing a bisexual floret; paleas 0 or minute. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong, obtuse, slightly compressed; embryo about half as long. *Pedicelled spikelet* similar but awnless; one lemma often present containing a σ floret.

Primary axis of the inflorescence short, much overtopped by the racemes, branches undivided:—

Leaves mostly aggregated near the base, glabrous or hairy, 1—6 in. long, .1—1.5 in. wide. Culms often creeping at the base, up to 30 in. long; racemes 1—10, 1—2.5 in. long; lower glumes usually with a median pit, rarely 2, on the back above the middle, but sometimes quite smooth, .11—14 in. long; awns .36—85 in. long.....1. *pertusa*.

Leaves mostly cauline, elongate:—

Lower glumes devoid of pits:—

Culms stout, up to 5 ft. high, nodes hairy; leaves 3—24 in. long, .15—3 in.

wide; racemes up to 6, 1—4 in. long; lower glume of sessile spikelets more or less long-hairy on the back below the middle, .16—.2 in. long; awns .65—1 in. long.

2. *pseudoischaemum*. Culms comparatively slender, up to 3 ft. high, nodes usually glabrous; leaves often involute, 4—14 in. long, .15—.25 in. wide; racemes few to many, 1—4 in. long; lower glume of sessile spikelets glabrous, often dorsally longitudinally depressed, .14—.17 in. long; awns .5—.85 in. long.

3. *Foulkesii*.

Lower glumes usually pitted, at least in most of the spikelets:—

Lower glume of pedicelled spikelets 2—4-pitted, .16—.2 in. long; that of sessile spikelets 1-pitted. Culms up to 3 ft. high; leaves 6—25 in. long, .12—.3 in. wide; racemes 1—14, 1.5—3.5 in. long; awns .46—.85 in. long.

4. *insculpta*.

Both lower glumes with 1 dorsal pit, seldom unpitted, .14—.19 in. long. Culms often robust, up to 7 ft. high; leaves 4—24 in. long, .12—.4 in. wide; racemes 8—20, sometimes more, flexuous, silky, 1.5—3 in. long; awns .12—.2 in. long.

5. *Kuntzeana*.

Primary axis up to 10 in. long, much longer than the racemes, stronger branches again branched. Culms 2—6 ft. high; leaves often setose at the base, 4—20 in. long, .2—.42 in. wide; racemes numerous, up to 2.5 in. long; lower glume of sessile spikelet with or without a dorsal pit, .12—.16 in. long, glabrous or somewhat hairy on the back below the middle, that of pedicelled spikelets unpitted; awns .4—.75 in. long.

6. *glabra*.

1. *AMPHILOPHIS PERTUSA*, Stapf. *Andropogon pertusus*, Willd.; F. B. I. vii. 173; S. I. G. figs. 152, 153.

In all Districts except the wettest localities; sea-level to 4,000 ft.

Often in saline soils. A good fodder and hay. Vern. *Ur*.

Basana; *Tel*. Janu gaddi, Turri gaddi; *Tam*. Chinna-karai pullu.

2. *AMPHILOPHIS PSEUDOISCHAEMUM*, C. E. C. Fischer n. comb. *Andropogon pseudoischaemum*, Nees; F. B. I. vii. 172.

Deccan and Coromandel; 1,000—2,000 ft.

3. *AMPHILOPHIS FOULKESII*, C. E. C. Fischer n. comb. *Andropogon Foulkesii*, Hook. f.; F. B. I. vii. 174.

Nilgiri, Pulney and Tinnevely Hills; 6,000—8,000 ft.

4. *AMPHILOPHIS INSCULPTA*, Stapf. *Andropogon pertusus*, Willd. var. *insculpta*, Hack.; F. B. I. vii. 174.

W. Ghâts from the Bababudan to the Pulney Hills; 3,600—7,000 ft. Vern. *Kan*. Henu ganjalu garikai hullu.

5. *AMPHILOPHIS KUNTZEANA*, Haines. *Andropogon Kuntzeanus*, Hack.; F. B. I. vii. 175.

Deccan; Carnatic; N. Coimbatore and Nilgiri Districts; sea-level to 2,000 ft. Uncommon.

6. *AMPHILOPHIS GLABRA*, Stapf. *Andropogon intermedius*, R. Br.; F. B. I. vii. 175. *A. montanus*, Roxb.; F. B. I. vii. 176.

N. Circars from Ganjam and the Rampa Hills to the Nallamallais; up to 3,500 ft. Vern. *Ur*. Gonda bena.

25. *Vetiveria*, Thouars

Coarse, perennial herbs with stout rhizomes; culms more or less compressed below. Leaves narrow, conduplicate in bud, ultimately flat; lower leaf-sheaths much compressed. Panicles erect, composed of many-rayed whorls of slender, simple, rarely compound racemes; rhachis 3—many-jointed, fragile; joints and pedicels slender. Spikelets 2-nate, one sessile and one pedicelled, the pairs subsimilar but differing

in sex. *Sessile spikelets* slightly laterally compressed. *Glumes* equal, coriaceous or chartaceous; lower rounded on the back, usually muticous, margins subinflexed; upper boat-shaped, keeled towards apex, mucronate or aristulate. *Lemmas* hyaline; lower 2-nerved, entire, empty; upper minutely 2-toothed, muticous, mucronate or with a more or less developed geniculate awn from the sinus, palea minute, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2. *Grain* oblong, slightly oblique at the apex. *Pedicelled spikelets* dorsally compressed, with much thinner glumes than those of the sessile spikelets, like the lemmas usually awnless, usually containing a ♂ floret.

Rootstock with spongy aromatic roots; culms tufted, stout, up to 6 ft. high or more; leaves distichous at the base, coriaceous, conduplicate at least below, 12—36 in. long, .15—.4 in. wide, usually glabrous; panicle 6—15 in. long; joints and pedicels glabrous; sessile spikelets with glabrous callus, lower glume muriculate, upper muriculate on the keel; upper lemma entire, muticous or mucromilate

1. *zizanioides*.

Rootstock horizontal, roots not spongy nor aromatic; culms comparatively slender, 1.5—5 ft. high; leaves chiefly subradical, rigidly herbaceous, 3—9 in. long, rarely up to 15 in., .06—.15 in. wide, glabrous or more often sparsely, shortly hairy and distantly ciliolate; panicles 4—8 in. long, narrow; joints and pedicels with a basal tuft of hairs; sessile spikelets with a bearded callus; lower glume narrowly ensiform with a row of marginal tubercles enlarging upwards and becoming spinulose at the tip, upper shorter, 2-fid with a slender arista .3—.5 in. long; upper lemma with a slender awn .8 in. long.....2. *Lawsoni*.

1. *VETIVERIA ZIZANOIDES*, Nash. *Andropogon squarrosus* Hack. non Linn. f.; F. B. I. vii. 186; S. I. G. fig. 154.

In all Districts except on the W. Coast; sea-level to 3,000 ft. The Khas-khas or Cus-cus grass.

A good fodder when young. The aromatic roots are used for making the well-known khas-khas mats for cooling dwellings and for fans. An aromatic and medicinal oil is extracted from the roots. Vern. *Hind.* Khas-khas; *Tel.* Vatti-veru; *Tam.* Vettiver, Virkel, Viyal; *Mal.* Vettiver; *Kan.* Kadu karai, Dhappa sajjai hullu.

2. *VETIVERIA LAWSONI*, Blatter et McCann. *Andropogon Lawsoni*, Hook. f.; F. B. I. vii. 187.

Mysore State; Coimbatore and Nilgiri Districts; 1,400—3,000 ft. Cattle are said to eat the leaves and reject the flowering culms. Vern. *Kan.* Karai hullu; Thoddu karai hullu.

26. *Pseudosorghum*, A. Camus

Annual herbs, decumbent below. Panicles contracted, dense; primary branchlets nearly always solitary, alternate, erect, branching from the base, lower secondary branchlets sometimes verticillate; racemes spiciform, dense, sessile or nearly so; rhachis fragile; joints and pedicels slender, hairy. *Spikelets* 2-nate, one sessile, the other pedicelled, differing only in sex. *Sessile spikelets* much imbricated; *Callus* short, bearded. *Glumes* subequal, chartaceous; lower 2-keeled; upper boat-shaped, 1-keeled. *Lemmas* hyaline; lower nearly as long as the glumes, sometimes paleate, empty; upper narrow, shorter, cleft for half its length into 2 narrow lobes with a geniculate awn from the sinus, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2,

free. *Pedicelled spikelets* narrower than the sessile, often much reduced, sometimes only 1 glume left: *Glumes* membranous, narrow; lower 2-keeled; upper similar or boat-shaped and 1-keeled. *Lemmas*, when present, hyaline; lower the longer, empty or containing a ♂ floret.

PSEUDOSORCHUM FASCICULARE, A. Camus. *Andropogon fascicularis*, Roxb.; F. B. I. vii. 117.

Ganjam (Gamble), Godavari (Barber) and Coimbatore (Fischer) Districts; Palghat Hills (Beddome); Cochin State (Meebold); sea-level to 4,000 ft.

Culms up to 5 ft. high; leaves sometimes very short but usually long, up to 20 in. long and 3 in. wide; panicles up to 5 in. long; racemes few or many and dense, 1.5–2 in. long; awns 4–6 in. long.

Vern. *Tel.* Konda-jeri.

27. *Sorghum*, Pers. sensu A. Camus

Annual or perennial, tall, sometimes woody. *Leaves* at first convolute, eventually flat. *Panicles* often large, with verticillate or scattered branches, usually lax in the wild species, frequently contracted or compacted in the cultivated ones; rhachis fragile or tough; divisions 1–few-jointed; joints and pedicels slender with ciliate edges. *Spikelets* 2-nate on the lateral nodes, one sessile, the other pedicelled or reduced to a pedicel, differing in shape and sex. *Sessile spikelets* more or less dorsally compressed or subglobose or ovate or elliptic: *Glumes* subequal, often coriaceous; lower 2-keeled at apex with narrowly inflexed margins, involute at base, apex erose or 3-toothed; upper shorter, convex, 1-keeled. *Lemmas* hyaline; lower as long as the glumes or nearly so, empty; upper oblong, 2-toothed or 2-fid, rarely entire, mucicous or mucronate or awned from the sinus, paleas sometimes present, including a bisexual floret. *Lodicules* 2, rather large. *Stamens* 3, very rarely 2. *Styles* 2, free. *Grain* obovate or linear-oblong in wild species, globose in cultivated ones, free; embryo half as long or more. *Pedicelled spikelets* more or less reduced, lemmas when present ♂ or empty.

Rhachis of racemes fragile; sessile spikelets falling together with the contiguous joint and pedicel; spontaneous perennial plants:—

Primary branches of the panicle undivided, up to 4 in. long:—

Culms solitary, stout, 3–8 ft. high; nodes white-silky; leaves 8–21 in. long, 1.5–3 in. wide; panicle ultimately effuse, 4–10 in. long; racemes whorled; peduncles very slender; joints, pedicels and spikelets purplish- or reddish-villous; lower glume of sessile spikelets black and polished when ripe; upper lemma acuminate, truncate or 2-fid for up to $\frac{1}{2}$ its length, mucicous, aristate or with an awn up to .56 in. long.....1. *nitidum*.
Culms tufted, comparatively thin, 6–24 in. high; nodes glabrous; leaves 2–4 in. long, 1.5–6 in. wide; panicles narrow, up to 5 in. long; racemes few, alternate; peduncles rather stout; joints and pedicels densely creamy-villous; glumes of sessile spikelets very coriaceous, tomentose on the back; awns .65 in. long.....2. *Stapfii*.

Primary branches of the panicle branched, up to 10 in. long, panicles usually effuse, 9–17 in. long. Culms solitary, stout, often woody, 3–15 ft. high; nodes glabrous or nearly so; leaves 5–33 in. long, .3–2.2 in. wide; glumes of sessile spikelets more or less hairy on the back; upper lemma cleft for $\frac{1}{2}$ to $\frac{1}{3}$ its length, with an awn .43–.52 in. long, seldom entire and mucicous...3. *halpense*.

Rhachis of racemes tenaceous; sessile spikelets persistent; usually annual, cultivated plants.....Cultivated species.

1. SORGHUM NITIDUM, Pers. *Andropogon serratus*, Thunb.; F. B. I. vii. 185.

In all Districts from Coorg to Travancore; 1,000—7,000 ft. Vern. *Kan.* Chikka narala hullu.

2. SORGHUM STAFFII, C. E. C. Fischer n. comb. *Andropogon Stapfii*, Hook. f.; F. B. I. vii. 184.
Palamkotta (Wight).

3. SORGHUM HALEPENSE, Pers. *Andropogon halepensis*, Brot.; F. B. I. vii. 182.

In all Districts, except on the W. Coast; sea-level to 7,000 ft. A good fodder and hay grass when mature; when young it is said to have sometimes had injurious and even fatal effects on animals eating it. Vern. *Tam.* Kadu-cholam; *Kan.* Kadukambu hullu.

CULTIVATED SPECIES: Various species and races of Sorghum are cultivated in all Districts. Hitherto these have been clubbed under the name *Andropogon Sorghum*, Brot.; F. B. I. vii. 183. The Great Millet.

The cultivated Sorghums are under revision by Mr. J. D. Snowdon, and until the result of his work is published it would be inadvisable to attempt a classification. As far as is known at present the following five species with varieties and races are grown in India: *S. Roxburghii*, Stapf, *S. bicolor*, Moench, *S. Durra*, Stapf, *S. cernuum*, Host, *S. subglabrescens*, Schweinf. et Aschers. The vernacular names, which cannot at present be correlated with the different species, are: *Hind.* Juari, Bajra; *Ur.* Jonna; *Tel.* Jonna, Jonnalu; *Tam.* and *Mal.* Cholam; *Kan.* Jola; with racial names qualifying each.

The plants are of great economic importance as comestible grains and as a fodder, hay and thatch grasses.

28. Chrysopogon, Trin.

Usually perennial, erect herbs. *Leaves* narrow, flat or complicate. *Panicles* terminal, usually lax, branches whorled, rarely 2-nate or solitary, simple or divided at the base. *Spikelets* in threes at the ends of the branches, one sessile and 2 pedicelled, falling together from the thickened, oblique, rarely glabrous tips of the peduncles, rarely 2-nate in 2-jointed racemes and then 1 sessile and 1 pedicelled, the sessile falling with the contiguous joint and pedicel; pedicels (and joints when present) filiform. *Sessile spikelets* usually laterally compressed: *Glumes* subequal, coriaceous or chartaceous; lower complicate or involute, backs rounded or more or less 1-keeled; upper boat-shaped, more or less 1-keeled. *Lemmas* hyaline; lower empty; upper entire or 2-toothed, with a more or less perfect geniculate awn; palea small or 0, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* linear, laterally compressed; embryo half as long. *Pedicelled spikelets* dorsally compressed: *Glumes* subequal, thin, sometimes awned. *Lemmas* hyaline, muticous, usually enclosing a ♂ floret.

Pedicels half as long as the sessile spikelets or longer:—

Pedicels glabrous. Rootstock woody, creeping; culms 5—20 in. high; leaves mostly basal, .8—6 in. long, .1—25 in. wide, glabrous, panicles 1.5—3.5 in. long, narrow, branches ascending sharply; glumes of sessile spikelets .14—17 in. long, upper mucronate; awns .16—24 in. long; glumes of pedicelled spikelets .14—24 in. long, muticous.....1. *aciculatus*.

Pedicels rufous-hairy; leaves usually puberulous:—

Lower glume, at least, of pedicelled spikelets aristate:—

Leaves conspicuously distichous, sheaths below much compressed and acutely keeled, often beset with bristles from bulbous bases, 3—21 in. long, .1—45 in. wide, often complicate, base semi-amplexicaul. Culms stout, 20—52 in. high; panicles 5—9 in. long, narrow, branches ascending; glumes of sessile spikelets .2—22 in. long, awn of upper .5—85 in. long; awn of lemma 1.7—2.8 in. long; glumes of pedicelled spikelets .33—35 in. long, lower with one awn .33—5 in. long, upper muticous or with an arista .22 in. long
2. *asper*.

Leaves not conspicuously distichous, not bristly, not semi-amplexicaul:—

Culms robust, up to 6 ft. high, lower nodes often bearded; leaves 14—20 in. long, .4—65 in. wide; sparsely pilose at base, finely acuminate, sheaths not keeled; panicles 7—13 in. long, pyramidal, branches ultimately horizontal; sessile spikelet with a callus .04—07 in. long, glumes .21—28 in. long, upper with an awn .32—46 in. long; awn of lemma 1.3—1.7 in. long; glumes of pedicelled spikelets .34—42 in. long, lower with an awn .24—42 in. long, upper muticous.....3. *verticillatus*.

Culms comparatively slender, up to 3 ft. high, nodes glabrous; leaves 1.7—9.5 in. long, .1—3 in. wide, usually abruptly acute, pubescent, rarely glabrous, lower sheaths somewhat compressed and keeled; panicles 5—7 in. long, branches ascending; sessile spikelets with a callus .09—2 in. long, glumes .18—23 in. long, awn of upper .36—66 in. long, awn of lemma 1.5—2.4 in. long; glumes of pedicelled spikelets .26—36 in. long, awn of lower .25—63 in. long, upper finely acuminate, muticous or mucronate.....4. *orientalis*.

Glumes of pedicelled spikelets .37—53 in. long, acuminate or caudate-acuminate, not aristate or awned. Culms 7—36 in. high; leaves 8—14 in. long, .15—6 in. wide, complicate, rather stiff, often densely imbricate at the base; panicles 3—6 in. long, branches erect or spreading; sessile spikelets with a callus .04—06 in. long, glumes .23—26 in. long, upper mucronulate or with an arista up to .26 in. long, awn of lemma 1.25—1.45 in. long...5. *zeylanicus*.

Pedicels less than half as long as the sessile spikelets:—

Leaves glabrous:—

Leaves not distichous:—

Upper glume of sessile spikelets more or less ciliate, usually rufous-hairy on the keel; glumes of pedicelled spikelets usually pubescent or hispid, lower aristate. Rootstock often creeping; culms 9—38 in. high; leaves 1.8—8 in. long, .05—1 in. wide, usually rigid, sometimes ciliate from bulbous bases; panicles 1.5—3 in. long, branches usually spreading; glumes of sessile spikelets .12—22 in. long, upper with an arista .26—33 in. long, awns of lemmas .92—1.1 in. long; glumes of pedicelled spikelets .13—22 in. long, lower with an arista .14—22 in. long (in variety *robusta* all parts larger)

6. *montanus*.

Upper glume of sessile spikelets glabrous; glumes of pedicelled spikelets muticous, glabrous. Culms 6 ft. or more high; leaves 6—36 in. long, .2—3 in. wide, sheaths silky at base, margins often silky-ciliate; panicles 4—6 in. long, branches spreading; glumes of sessile spikelets .17—22 in. long, upper with arista .12—3 in. long, awn of lemmas .76—1.2 in. long; glumes of pedicelled spikelets .17—18 in. long.....7. *Hackelii*.

Leaves conspicuously distichous, 4.5—8.2 in. long, .15—2 in. wide. Rootstock woody, creeping; culms up to 3 ft. high; panicles 3—6 in. long, branches ascending; hairs of pedicels and callus pale straw-coloured, latter slender, glabrous in upper half; glumes of sessile spikelets .22—24 in. long, upper mucronate; awn of lemma .47—56 in. long; glumes of pedicelled spikelets .22 in. long, muticous.....8. *polyphyllus*.

Leaf-sheaths and blades puberulous, blades 5—9 in. long, $\frac{1}{4}$ — $\frac{1}{2}$ in. wide. Culms 1—2 ft. high; panicles 2—3 in. long, branches spreading with sparsely, shortly, white-ciliate apices; glumes of sessile spikelets $\frac{21}{2}$ — $\frac{25}{2}$ in. long, pale, upper more or less rufous-hairy, with an arista $\frac{16}{2}$ — $\frac{28}{2}$ in. long; awn of lemmas 1—2 in. long; glumes of pedicelled spikelets $\frac{15}{2}$ — $\frac{2}{2}$ in. long, muticous, lower rufous-hispid in lower half.....9. *velutinus*.

1. CHRYSOPOGON ACICULATUS, Trin. *Andropogon aciculatus*, Retz.; F. B. I. vii. 188.
In all Districts; sea-level to 2,000 ft. The Love-grass. Eaten by cattle before flowering. Vern. Tel. Putthi gaddi.
2. CHRYSOPOGON ASPER, Heyne ex Hook. f. *Andropogon asper*, Heyne ex Hook. f.; F. B. I. vii. 189; S. I. G. figs. 155, 156.
Cuddapah District; Horsleykonda; Kambakkam Hills; Nilgiri Hills at Naduvattam; 1,000—6,000 ft.
Doubtfully distinct from *C. orientalis*, A. Camus.
3. CHRYSOPOGON VERTICILLATUS, Trin. *Andropogon verticillatus*, Roxb.; F. B. I. vii. 189.
Rampa Hills at 2,000—3,000 ft. (Narayanaswami); Godavari District (Bourne).
4. CHRYSOPOGON ORIENTALIS, A. Camus. *Andropogon Wightianus*, Steud.; F. B. I. vii. 191; S. I. G. fig. 157.
In most Districts from Cuddapah southwards; sea-level to 7,000 ft.
A conspicuous grass owing to the bright red or purple glumes of the pedicelled spikelets.
5. CHRYSOPOGON ZEYLANICUS, Thw. *Andropogon zeylanicus*, Nees; F. B. I. vii. 192.
W. Gháts; 4,000—8,000 ft.
The glumes of the pedicelled spikelets are purple and green. Vern. Kan. Badi hullu.
6. CHRYSOPOGON MONTANUS, Trin. *Andropogon monticola*, Schult.; F. B. I. vii. 192; S. I. G. fig. 158.
In all Districts except the W. Coast; sea-level to 3,000 ft.
Often on laterite soil.
A good fodder grass. Vern. Tel. Gurra batto kelu.
Var. *robustus*, Hook. f.; F. B. I. vii. 193.
Culms stouter and taller; all parts larger.
Godavari, Kistna, Guntur, Bellary and Coimbatore Districts. Vern. Kan. Chello san kanni.
7. CHRYSOPOGON HACKELII, C. E. C. Fischer n. comb. *Andropogon Hackelii*, Hook. f.; F. B. I. vii. 194.
W. Gháts from Coorg to Travancore; 2,000—5,000 ft.
8. CHRYSOPOGON POLYPHYLLUS, Blatter et McCann. *Andropogon polyphyllus*, Hack. ex Hook. f.; F. B. I. vii. 194.
Godavari District; Devypatnam (Gamble) and Kolur Gorge (Bourne).
9. CHRYSOPOGON VELUTINUS, Arn. ex Hook. f. *Andropogon velutinus*, Hook. f.; F. B. I. vii. 194.
Cuddapah District (Wight).

29. *Dichanthium*, Willemet

Perennial, seldom annual, tufted herbs. *Leaves* narrow. *Inflorescence* of subdigitate, rarely solitary, subpanicked or racemously arranged, short-peduncled, spiciform racemes; joints and pedicels slender. *Spikelets* 2-nate, one sessile, the other pedicelled, similar in shape and size, differing in sex, the lowermost 1—2 pairs of the raceme usually homogamous and ♂ or empty. *Sessile spikelets* dorsally compressed: *Glumes* equal, thinly chartaceous; lower usually rounded at the apex, 2-keeled, at least in the upper half; upper boat-shaped, acutely 1-keeled. *Lemmas* usually without palea, sometimes a minute upper one present; lower hyaline empty; upper reduced to a firm pale stipe hyaline at base, passing into a geniculate awn, the stipe rarely very narrowly margined and finely 2-fid at apex; its floret bisexual. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong, obtuse, slightly compressed. *Pedicelled spikelets* awnless; lower lemma present or not, if present sometimes empty, sometimes containing a ♂ floret.

Culms leafy; leaves glabrous or sparsely hairy; glumes .18 in. or less long; upper lemma of sessile spikelets reduced to an awn:—

Stem below inflorescence and peduncles of spikes glabrous:—

Culm nodes patently hairy, rarely glabrous; culms up to 40 in. high; leaves 2—11 in. long, .1—2 in. wide; racemes 2—9, 1—3 in. long; glumes .1—1.5 in. long, lower of sessile spikelets elliptic, apex rounded or narrowed and obtuse; awns .6—1 in. long.....1. *annulatum*. Nodes usually glabrous, seldom somewhat hairy, rarely patently so; racemes solitary or sometimes 2-nate; lower glume of sessile spikelets obovate or obovate-oblong:—

Culms usually erect from a geniculate base, 10—36 in. high, occasionally dwarf and 3—4 in. high; leaves 1.5—4.5 in. long, .05—1.7 in. wide; racemes 1.4—2.2 in. long; glumes .12—1.5 in. long, apex rounded or subacute; awns .6—9 in. long.....2. *caricosum*.

Culms creeping, apical 2—6 in. erect; leaves .9—2 in. long, .05—1 in. wide; racemes .8—1 in. long; glumes .16 in. long, apex rounded; awns .75 in. long.....3. *pallidum*.

Stem below the inflorescence usually and peduncles always softly, patently hairy; culms 1—4 ft. high; nodes usually patently hairy, sometimes glabrous; leaves 3—12 in. long, .1—2 in. wide; racemes 1—6, 2—3.5 in. long; glumes .13—1.8 in. long, lower of sessile spikelets elliptic-oblong to broadly obovate, apex rounded or narrowed and obtuse; awns .7—1.1 in. long.....4. *nodosum*.

Culms naked or with 1—2 reduced leaves, 20—40 in. high, slender; leaves mostly basal, 7—10 in. long, .1 in. wide, the cauline up to 4.5 in. long, softly hairy on both sides, often involute; racemes usually solitary, sometimes 2—3, 2—2.2 in. long; glumes .26—4 in. long, lower of sessile spikelets narrowly elliptic-oblong to lanceolate, acute or obtuse, up to .36 in. long; awns .9—1.2 in. long, their bases with a narrow hyaline margin cleft for about $\frac{1}{2}$ its length into 2 capillary lobes.....5. *polytychum*.

1. *DICHANTHIUM ANNULATUM*, Stapf. *Andropogon annulatus*, Forsk.; F. B. I. vii. 196; S. I. G. figs. 160, 161.

In all the Eastern and Central Districts; at low elevations. A fair fodder.

2. *DICHANTHIUM CARICOSUM*, A. Camus. *Andropogon caricosus*, Linn.; F. B. I. vii. 196; S. I. G. fig. 159.

In all Districts except the W. Coast; near sea-level to 3,000 ft. A fair fodder. Vern. Kan. Urukun hullu.

3. *DICHANTHIUM PALLIDUM*, Stapf MS. n. comb. *Apocopsis pallida*, Hook. f.; F. B. I. vii. 143.
Nilgiri Hills (Foulkes).
This may be an impoverished form of the last species.
4. *DICHANTHIUM NODOSUM*, Willem. *Andropogon caricosus*, Linn. var. *mollicomus*, Hack.; F. B. I. vii. 196.
Mysore State; Godavari, Bellary, Salem and Coimbatore Districts; 1,000—3,000 ft.
5. *DICHANTHIUM POLYPTYCHUM*, A. Camus. *Andropogon polyptychus*, Steud.; F. B. I. vii. 198.
Nilgiri and Pulney Hills (Bourne); 6,000—7,000 ft.

30. Heteropogon, Pers.

Annual or perennial usually branched herbs; branches mostly flowering and gathered into spatheate panicles. *Leaves* narrow, flat. *Racemes* spiciform, usually solitary, terminating the culms or their sometimes fascicled branches; spikelets 2-nate, one sessile, the other pedicelled, the 1—several lower pairs alike, ♂ or empty, the upper pairs differing in sex and strikingly in shape; rhachis many-jointed, not or tardily disarticulating between the homogamous pairs of spikelets, fragile between the heterogamous. *Fertile sessile spikelets* terete or subterete. *Callus* often pungent, densely bearded upwards. *Glumes* equal, coriaceous or chartaceous, obtuse. *Lemmas* hyaline; lower empty; upper very slender, cartilaginous at apex and passing into a usually stout, geniculate awn; palea small or 0, enclosed floret ♀ or bisexual. *Lodicules* 2, large to minute. *Stamens* 3, or rudimentary or 0. *Grain* sublinear, terete; embryo slightly more than half as long. *Lower sessile and pedicelled spikelets* dorsally compressed, often twisted, imbricate: *Glumes* dissimilar; lower 2-keeled, usually winged upwards on one or both keels. *Lemmas* hyaline, often more or less reduced or suppressed, with or without 3 stamens.

Joints and pedicels glabrous; lower glume of fertile spikelets tightly involute, brown-hispid:—

Culms usually tall, comparatively stout; leaves glabrous or more or less setose from tubercles at the base; upper glume of fertile spikelets deeply grooved on both sides of the midrib:—

Leaves basal or basal and cauline, not strikingly distichous, very variable, 2—17 in. long, .1—4 in. wide. Culms 6—45 in. high; racemes 1—2.5 in. long; fertile spikelets with a callus .07—11 in. long, densely rufous-hairy; glumes .15—22 in. long; awns 2—3.5 in. long; lower glume of other spikelets .23—31 in. long, glabrous or more or less densely setose from tubercles, upper glume slightly longer, glabrous or with a few apical setae from tubercles

1. contortus.

Leaves from the middle of the culm, strikingly distichous, rigid, complicate, usually curved, 1—3 in. long, .1—1.3 in. wide. Culms 15—18 in. high, sheathed below; glumes of fertile spikelets .24—27 in. long; awns .21—24 in. long; glumes of other spikelets .36—4 in. long, subequal, glabrous

contortus var. distichus.

Culms slender, 6—9 in. high; leaves 1—2.5 in. long, .05 in. wide, glabrous or puberulous, ciliate at base; racemes .5—1.5 in. long; fertile spikelets with a callus .09—1 in. long, rufous-hairy on one side, glumes .22—23 in. long, upper not channelled, awns 1.6 in. long; glumes of other spikelets .28 in. long, glabrous

2. polystachyos.

Joints and pedicels whitish hairy; lower glume of fertile spikelets not tightly involute:—

Leaves flat, .5—2.6 in. long, .12—22 in. wide, hirsute, margins thickened. Culms slender, almost capillary, 2—12 in. high; racemes sometimes 2-nate, .5—1.5 in. long; lower glume of fertile spikelets .13—16 in. long, oblong, convex, pale silky-hairy at least below the middle, upper boat-shaped, hardly keeled, glabrous; awns 1—1.6 in. long, glabrous in basal half; glumes of other spikelets .14—18 in. long, lower elliptic-oblong, truncate or 3-lobulate, 2-keeled, keels narrowly winged at apex.....3. *oliganthus*.

Leaves tightly involute, filiform, 3—8 in. long, glabrous. Culms wiry, 16 or more in. high; racemes 2—2.5 in. long; glumes of fertile spikelets .23—26 in. long, glabrous, lower narrowly linear-lanceolate, 2-toothed, 2-keeled at apex, with a deep median channel below the middle, glabrous, upper narrowly boat-shaped, not keeled, arista .13—15 in. long, slender, hairy below the middle; glumes of other spikelets .31—34 in. long, narrowly lanceolate, acuminate, 2-keeled, glabrous.....4. *bellariensis*.

1. *HETEROPOGON CONTORTUS*, Beauv. ex Roem. et Schult. *Andropogon contortus*, Linn.; F. B. I. vii. 199; S. I. G. figs. 162, 163.

In all Districts; sea-level to 7,500 ft.

All the awns of a raceme often twisted about each other. A variable and very common, gregarious and very troublesome grass owing to the sharp, barbed callus and the hygroscopic awns which cause the fruit to adhere to and penetrate into the clothing of man and the hairs of animals. The Spear-grass.

A good fodder and suitable for hay-making, but when in fruit the latter should first be separated. Useful for thatching. Vern. *Hind.* Kher; *Ur.* Sinkolo; *Tel.* Eddi gaddi, Kaseri gaddi; *Dubba* gasari gaddi, Yerragoyi; *Tam.* Oosi pullu, Karunsi pullu, Pani pullu; *Kan.* Kari vunugada hullu, Sunkari hullu.

Var. *distichus*, C. E. C. Fischer n. var.

Anamallais at 3,500 ft. (Barber); Kodaikanal, 6,000—7,000 ft. (Bourne).

2. *HETEROPOGON POLYSTACHYOS*, Schult. *Andropogon polystachyos*, Roxb.; F. B. I. vii. 202.

Without precise locality (Wight).

3. *HETEROPOGON OLIGANTHUS*, Blatter et McCann. *Andropogon oliganthus*, Hochst.; F. B. I. vii. 201.

W. Ghâts from Kudrai Mukh to Travancore; 3,000—8,000 ft.

4. *HETEROPOGON BELLARIENSIS*, C. E. C. Fischer n. comb. *Andropogon bellariensis*, Hack.; F. B. I. vii. 201.

Anantapur District on Gooty Fort Hill (Campbell, Wight).

31. *Themeda*, Forsk.

Coarse annual or perennial herbs. Leaves narrow. Inflorescence terminating the culms and their upper branches in short solitary racemes subtended by spathes, crowded in panicle, often, glomerate fascicles; rhachis terete, tough or tardily disarticulating and glabrous between the homogeneous pairs of spikelets, readily disarticulating above them. Spikelets 2-nate, the terminal group 3-nate; 2 lowest pairs persistent, alike, ♂ or empty, sessile or subsessile, closely approximate to form a quasi involucre, the following pairs differing in sex and conspicuously in shape, one sessile, the other on a jointed pedicel, and falling with the upper part of the pedicel. Involucral and pedicelled

spikelets similar, the latter narrower, much dorsally compressed, awnless: *Glumes* usually 2; lower 2-keeled, one or both keels sometimes scariously winged; upper occasionally suppressed. *Lemmas* hyaline; upper often suppressed, both or either with or without a ♂ floret. *Sessile spikelets* above the involucre terete: *Callus* usually acute to pungent, so densely bearded as to conceal more or less the adjacent joint and pedicel bases. *Glumes* equal, coriaceous except the submembranous tips; lower tightly involute, without keel, sometimes grooved down the middle; upper with a deep longitudinal groove on each side, firm between the grooves, margins thin. *Lemmas* dissimilar; lower hyaline, epaleate, empty; upper stipitiform, base hyaline, cartilaginous upwards and passing into a stout geniculate awn, or hyaline throughout and awnless or passing into a more or less reduced awn, paleate or not, containing a bisexual floret. *Lodicules* 2, rather large. *Stamens* 3. *Styles* 2. *Grain* linear-obovate, subterete, grooved on the front; embryo about half as long.

Involucral spikelets all on the same level; only one bisexual spikelet in the raceme:—

Branching strict; clusters of inflorescence very numerous in numerous fascicles:—

Perennial, erect; culms robust, up to 10 ft. high; leaves 10–20 in. long, .1–.55 in. wide; clusters in globose or fan-shaped, drooping fascicles; lower glumes of involucre spikelets .23–.42 in. long, glabrous or more or less setose from tubercles; lower glume of bisexual spikelets .18–.27 in. long, glabrous, pubescent or rarely densely silky, sometimes muriculate, apex usually hispid; awns .6–2.5 in. long.....1. *triandra*.

Annual, erect or more often geniculately ascending and scrambling; culms slender, up to 6 ft. long; leaves up to 12 in. long and .25 in. wide; clusters usually narrow, erect or suberect; lower glumes of involucre spikelets .18–.2 in. long, margins in upper half beset with stiff bristles from large tubercles; lower glumes of bisexual spikelets .16–.17 in. long, puberulous; awns 1.3–1.5 in. long.....2. *quadrivalvis*.

Branching very effuse; clusters few in few, small, superposed fascicles on filiform branches; leaves on the main culms up to 14 in. long and .3 in. wide, tips filiform, upper leaves 3–4 in. long, filiform; lower glumes of involucre spikelets .26–.27 in. long, glabrous except for a very few bristles from tubercles near the apex; lower glumes of bisexual spikelets .18 in. long, glabrous and shining below, hispidulous at apex; awns 1–1.7 in. long.....3. *laxa*.

Involucral spikelets in superposed pairs; often 2 bisexual spikelets in the raceme:—

Panicle racemiform; lower glumes of bisexual spikelets .12–.14 in. long, back longitudinally channelled. Culms usually slender, up to 4 ft. high, leafy, not clothed at base with leaf-sheaths; leaves 3–20 in. long, .1–.55 in. wide; spathules usually finely setose from large tubercles; lower glumes of involucre spikelets .26–.34 in. long; setose from minute tubercles; awns .8–1.3 in. long.....4. *tremula*.

Panicle decompound, thyriform; lower glumes of bisexual spikelets .14–.18 in. long, not channelled. Culms robust, up to 10 ft. high, clothed at the base with broad, coriaceous, equitant leaf-sheaths; leaves up to 4 ft. long and .33 in. wide; spathules slender, glabrous; lower glumes of involucre spikelets .17–.24 in. long, glabrous, rarely setose from minute tubercles, apex hispidulous; awns .6–.9 in. long.....5. *cymbaria*.

1. THEMEDA TRIANDRA, Forsk. *Anthistiria imberbis*, Retz.; F. B. I. vii. 211.

In all Districts; sea-level to 7,000 ft.

Very variable, especially in indumentum. Eaten by cattle only when young. Vern. *Tam. Erigai thattu pullu*; *Kan. Bettanchi hullu*, *Thodda anji hullu*, *Gondamanchi hullu*.

2. *THEMEDA* QUADRIVALVIS, O. Ktz. *Anthistiria ciliata*, Linn. f.; F. B. I. vii. 213.
Ganjam, Kurnool, Bellary, Coimbatore and Tinnevely Districts; Coorg, Mysore State. Ver. Kan. Guntu nalai hullu.
3. *THEMEDA* LAXA, Stapf ex Haines. *Anthistiria laxa*, Anderss.; F. B. I. vii. 213.
Rampa (Narayanswami) and Vizagapatam Districts. (K. Ranga Achariyar), 2,500 ft.
4. *THEMEDA* TREMULA, Hack. *Anthistiria tremula*, Nees; F. B. I. vii. 214; S. I. G. fig. 165.
Hills from Coorg to Travancore; S. Kanara District; near sea-level to 7,000 ft.
5. *THEMEDA* CYMBARIA, Hack. *Anthistiria cymbaria*, Roxb.; F. B. I. vii. 215.
W. Gháts; 1,000—7,000 ft. Vern. Tam. Noshia palai pullu; Kan. Balai hullu.

32. *Iseilema*, Andersson

Annual or perennial; culms compressed, at least at base. *Leaves* narrow with compressed, keeled sheaths. *Panicles* with usually fascicled branches interspersed with spathe-like bracts. *Racemes* fascicled, each in the axil of a complicate spathe with scarious margins. *Spikelets* lanceolate, the four basal whorled to form a quasi involucre as in *Themeda*, but all pedicelled; rhachis short, bearing one sessile and two pedicelled spikelets, or sometimes 2-jointed and then the lower with one sessile and one pedicelled spikelet, disarticulating from the peduncle immediately below the involucre spikelets. *Involucral and upper pedicelled spikelets* similar, the latter usually narrower and with longer pedicels, sometimes much reduced or represented by the pedicel alone: *Glumes* membranous, subequal, more or less 2-keeled, usually strongly nerved. *Lemmas* hyaline, usually only the lower present, epaleate, containing a ♂ floret. *Sessile spikelets* with a very short, more or less bearded callus: *Glumes* subequal, coriaceous or chartaceous; lower lanceolate, truncate, emarginate or 2-toothed; upper more or less boat-shaped, acute. *Lemmas* dissimilar; lower short, hyaline, epaleate, empty; upper a hyaline stipe passing into a geniculate awn, subtending a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong, dorsally compressed; embryo half as long.

Pedicels of involucre spikelets longer than broad, glabrous; glumes membranous; glumes of sessile spikelets lanceolate, glabrous on the back; upper pedicels slender, .05—1 in. long, sparsely hairy, their spikelets like the involucre:—

Spathes very narrow, rarely without minute tubercles on the keel and margins; peduncles very slender, .28—5 in. long, often much exserted, hispidulous upwards, minutely tubercular at apex. Culms 4—36 in. high; leaves 1.2—6 in. long, .05—1 in. wide; pedicelled spikelets .14 in. long; glumes of sessile spikelets .11—12 in. long; awns .4 in. long.....1. *prostratum*.
Spathes comparatively broad, devoid of tubercles; peduncles .08—1 in. long, not exserted, devoid of tubercles. Culms 10—40 in. high; leaves 2—8 in. long, .05—15 in. wide; pedicelled spikelets .17—21 in. long; glumes of sessile spikelets .14—2 in. long; awns .45—5 in. long.....2. *laxum*.

Pedicels of involucre spikelets as broad at apex as long, sides and base densely bearded; glumes coriaceous, .23—27 in. long, longitudinally depressed on each

side of midrib. Culms 3—30 in. high; leaves 1—4·5 in. long, ·07—·18 in. wide; spathes usually glabrous, sometimes sparsely ciliate from rather large tubercles; glumes of sessile spikelets beaked, the beak 2-keeled, lower ·22—·24 in. long, back more or less pubescent, upper slightly shorter, more or less 1-keeled; awns ·54 in. long; upper pedicels ·12—·15 in. long, capillary, glabrous, bearing 1 or 2 much reduced glumes or none.....3. *anthephoroides*.

1. *ISEILEMA PROSTRATUM*, Anderss. *I. Wightii*, Anderss.; F. B. I. vii. 218.

Northern and Eastern Districts; Nilgiri and Coimbatore Districts; at low elevations in the drier parts.

An excellent fodder.

2. *ISEILEMA LAXUM*, Hack.; F. B. I. vii. 218; S. I. G. figs. 166—168.

In all Eastern and Central Districts from Ganjam to S. Arcot; Mysore State; sea-level to 2,500 ft.

An excellent fodder. Often confused with the previous species. Vern. *Tel.* Erra chengali gaddi; *Tam.* Tenga nari pillu.

3. *ISEILEMA ANTHEPHOROIDES*, Hack.; F. B. I. vii. 219; S. I. G. figs. 169, 170.

In the coastal Districts from Ganjam to Nellore; Bellary and Cuddapah Districts; sea-level to 1,000 ft.

33. *Pseudanthistiria*, Hook. f.

Annual herbs. *Leaves* narrow. *Panicles* leafy; branches slender, each terminating in a subumbellate fascicle of racemes subtended by a spathe-like bract. *Racemes* subtended by a complicate, acuminate or caudate, keeled spathe, resembling those of *Themeda*, but lacking the involucre spikelets, 2-jointed, the basal with one sessile and one pedicelled spikelet, the upper with one sessile and 2 pedicelled. *Sessile spikelets* with a short, short-bearded callus: *Glumes* subequal; lower chartaceous, slightly narrowed upwards, truncate, margins narrowly inflexed in upper part, broadly involute below; upper membranous, lanceolate acute or obtuse. *Lemmas* dissimilar; lower small, quadrate, empty; upper stipitiform, hyaline below, hardening upwards into a fine geniculate awn, subtending a bisexual floret. *Lodicules* 2, rather large. *Stamens* 3. *Grain* small. *Pedicelled spikelets* with slender pedicels $\frac{1}{2}$ as long: *Glumes* subequal, membranous. *Lemmas* 0, or sometimes one present. *Lodicules* and *stamens* as in the sessile spikelet.

Leaves tapering from base to apex, more or less hairy from tubercles on both sides; primary nerves 3—4 on each side of the midrib distinct from the finer secondaries; peduncles ·04 in. long, pubescent; back of lower glume of sessile spikelets not sulcate; lower glume of pedicelled spikelets usually sparsely setose at apex:—

Spathes ·25—·3 in. long, margins setose, usually from minute tubercles; lower glume of sessile spikelets nerveless or nerves 2 at the apex, ·1—·11 in. long. Culms erect, up to 2 ft. high; leaves 1·5—6 in. long, ·06—·15 in. wide, base slightly narrowed; awns ·6—·76 in. long; lower glume of pedicelled spikelets ·1—·12 in. long.....1. *heteroclita*.

Spathes ·32—·8 in. long, margins only or most of the face in lower half bristly from rather large, sometimes blackish tubercles; lower glume of sessile spikelets ·12—·22 in. long, 7-nerved. Culms erect, up to 3 ft. high; leaves 3—7·5 in. long, ·18—·3 in. wide, base rounded; awns ·9—1·2 in. long; lower glume of pedicelled spikelets ·14—·22 in. long.....2. *hispida*.

Leaves widest near the middle, glabrous, primary and secondary nerves usually indistinguishable, ·9—2·4 in. long, ·1—·3 in. wide. Culms erect from decumbent,

rooting bases, slender, up to 18 in. high; spathes 4—52 in. long, margins finely ciliate from minute tubercles; peduncles .05—12 in. long, hairy; lower glume of sessile spikelets .14—18 in. long, 7-nerved, back slightly sulcate on each side of the midrib; awns .75—1 in. long; lower glume of pedicelled spikelets .2—24 in. long, not setose.....3. *umbellata*.

1. *PSEUDANTHISTIRIA HETEROCLITA*, Hook. f.; F. B. I. vii. 219.
S. Kanara and S. Malabar District; near the coast.
2. *PSEUDANTHISTIRIA HISPIDA*, Hook. f.; F. B. I. vii. 219.
Mysore State; S. Kanara; sea-level to 4,000 ft.
3. *PSEUDANTHISTIRIA UMBELLATA*, Hook. f.; F. B. I. vii. 220.
Godavari District; W. Coast and Gháts, from Coorg southwards; sea-level to 4,000 ft.

34. *Apluda*, Linn.

Annual or perennial, leafy herbs, often geniculate and rooting from the nodes. *Leaves* flat, sometimes petioled. *Panicles* compound, leafy; branchlets clustered, clusters subtended by a spathe. *Spikelets* in threes at the tips of the branchlets, embraced by a boat-shaped bract, 1 sessile and 2 pedicelled, all similar in shape, muticous or the sessile awned, alike in sex or more often the pedicelled ♂ only; the whole falling together with the bulbous basal joint, or else the pedicelled spikelet when fertile disarticulating separately; the terminal spikelet small or almost suppressed, on a broad, flat, glume-like pedicel. *Glumes* equal; lower convolute, margins not or very narrowly inflexed; upper keeled. *Lemmas* hyaline, paleate; lower entire muticous, usually containing a ♂ floret; upper deeply 2-fid, and geniculately awned from the sinus or entire or nearly so and muticous, containing a bisexual floret, or in the pedicelled spikelets with a ♂ floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong, slightly laterally compressed.

Upper lemma of sessile spikelets 2-lobed for half its length or more; awn .26—66 in. long. Culms 1—10 ft. high; leaves 2.5—15.5 in. long, .1—65 in. wide, narrowed at the base and often with a petiole up to 1.5 in. long; bracts .16—34 in. long, aristate; basal joint small and hemispheric or up to .16 in. long and turbinate or cylindric; lower glume of sessile spikelet .12—31 in. long, margins narrowly winged above the middle.....1. *aristata*.

Upper lemma of sessile spikelet entire or very shortly 2-lobed, awnless. Otherwise as in the last species, but more slender, usually smaller in all its parts and more glabrous.....2. *mutica*.

1. *APLUDA ARISTATA*, Linn. *A. varia*, Hack. subsp. *aristata*, Hack.; F. B. I. vii. 150; S. I. G. figs. 142, 143.

In all Districts; sea-level to 7,000 ft.

Common, very variable in the dimensions of all its parts and in indumentum. Often scrambling over bushes.

A fairly good fodder, readily eaten by cattle when young. Vern. *Hind.* Gururna; *Tam.* Manda pillu, Mungil pillu, Sengamanri pillu; *Kan.* Sanna kari kachi hullu, Akku hullu.

2. *APLUDA MUTICA*, Linn. *A. varia*, Hack. subsp. *mutica*, Hack.; F. B. I. vii. 150.
Pondicheri (Perrottet).

35. *Eremopogon*, Stapf

Perennial, rarely annual, erect herbs; culms simple below, more or less branched above, sometimes in fastigate bundles each supported by a bladeless sheath. *Racemes* spiciform, solitary, terminating each branchlet, spatheate; rhachis many-jointed, fragile, joints and pedicels filiform. *Spikelets* 2-nate, one sessile and one pedicelled, similar in shape, differing in sex, except the 1—3 lowest pairs which are homogeneous and ♂ or empty, disarticulating horizontally. *Sessile spikelets* dorsally compressed: *Callus* small, shortly bearded. *Glumes* equal, thinly chartaceous to membranous; lower 2-keeled with narrowly inflexed margins; upper boat-shaped, acutely 1-keeled. *Lemmas* dissimilar; lower hyaline; upper reduced to a slender stipe, hyaline below, passing into a geniculate awn, rarely with a very narrow hyaline margin shortly cleft at the apex, subtending a bisexual floret; paleas 0. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Pedicelled spikelets* similar to the sessile, but awnless. *Lemmas* usually absent, sometimes one hyaline, containing a ♂ floret.

EREMOPOGON FOVEOLATUS, Stapf. *Andropogon foveolatus*, Del.; F. B. I. vii. 168; S. I. G. figs. 148, 149.

In all the hotter parts; Bababudan Hills (Meebold); sea-level to 3,000 ft.

Culms tufted, 6—30 in. high; basal sheaths white- or cream-tomentose; leaves 1·3—6 in. long, almost filiform to 1 in. wide; racemes 6—1·5 in. long; glumes 12—14 in. long, lower ones with a circular median pit above the middle of the back; awns 7—9 in. long. A good fodder.

36. *Schizachyrium*, Nees

Annual or perennial herbs. *Leaves* narrow. *Inflorescence* of terminal, solitary, spiciform racemes supported by or more or less enclosed in narrow spathes, frequently collected into a false panicle; rhachis fragile, many-jointed; joints often stout, thickened upwards with a scarious, cupuliform, more or less toothed terminal appendage. *Spikelets* 2-nate, one sessile, the other pedicelled, differing in sex and often in size and shape, both falling together with the contiguous joint. *Sessile spikelets* dorsally compressed: *Glumes* subequal; lower chartaceous or subcoriaceous. *Lemmas* hyaline; lower empty; upper 2-toothed or 2-fid, rarely entire, awned from the apex or sinus, containing a bisexual floret. *Lodicules* 2. *Stamens* 3, rarely 2. *Styles* 2, free. *Grain* narrowly linear, subterete; embryo short. *Pedicelled spikelets* similar; lower lemma empty; upper if present containing a ♂ floret.

Culms solitary or 2—3 together, 2—30 in. high, divaricately branched from most of the nodes; leaves suddenly narrowed to a sharp point, at least those on the main stems, base rounded and constricted, 7—1·8 in. long, 0·7—2 in. wide; spathes 4—7·5 in. long, usually as long as the raceme; joints 0·8—1·1 in. long, glabrous, with a tuft of hairs at the base; lower glume of sessile spikelets 1—1·2 in. long; minutely puberulous; callus with a tuft of hairs; awns 28—36 in. long

1. *brevifolium*.

Culms tufted, usually densely so, 2—22 in. high, fastigiate branched; leaves tapering from the not or slightly constricted base to the acuminate tip, 1—4 in.

long, .05—1 in. wide; spathes .8—1.7 in. long, often becoming bright red, racemes usually exserted; joints .17—2 in. long, densely long white-hairy on the back; lower glume of sessile spikelets .2—2.2 in. long, back long-white-hairy; awns .4—5.5 in. long.....2. *exile*.

1. *SCHIZACHYRIUM BREVIFOLIUM*, Nees. *Andropogon brevifolius*, Sw.; F. B. I. vii. 165.

Godavari District at Bison Hill (Barber); Nilgiri Hills at Gudalur; Travancore State.

2. *SCHIZACHYRIUM EXILE*, Stapf. *Andropogon exilis*, Hochst.; F. B. I. vii. 166.

Nellore and Anantapur Districts; Travancore State.

37. *Andropogon*, Linn.

Usually perennial, erect herbs. *Leaves* usually flat. *Inflorescence* of paired, rarely solitary, or corymbose, often digitate or subdigitate, spiciform racemes subtended by spathes, terminating the culms or their branches, sometimes collected into false panicles; rhachis articulated, fragile; joints and pedicels very slender, usually plano-convex, thickened upwards, cupped and usually 2—3-toothed at the apex, more or less densely ciliate. *Spikelets* 2-nate, one sessile, the other pedicelled, differing in sex and usually more or less in shape and size, the lowest pair sometimes homogeneous and imperfect. *Sessile spikelets* dorsally or laterally compressed: *Glumes* equal or subequal, membranous to coriaceous; lower flat, concave or channelled on the back, margins inflexed and sharply keeled at least in the apical half, keels sometimes winged; upper boat-shaped, 1-keeled upwards, sometimes aristulate. *Lemmas* hyaline or the upper one firmer, with or without small paleas; lower empty; upper 2-toothed or -fid, awned from the sinus, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* subulate to oblong, subterete or plano-convex; embryo half as long. *Pedicelled spikelets* often very different from the sessile, always more or less dorsally compressed, never concave or channelled on the back, sometimes reduced and small or entirely suppressed: *Glumes* membranous to chartaceous; upper often 2-keeled upwards, keels sometimes narrowly winged; lower mucicous or aristulate. *Lemmas* if present, hyaline, ciliate, mucicous; lower empty; upper containing a ♂ floret.

Leaves not or only slightly narrowed at the base:—

Lower glume of sessile spikelets linear-oblong, back deeply channelled, keels not winged; upper lemma of sessile spikelets shortly 2-fid:—

Culms 4—6 ft. high; lower leaves 1—3 ft. long, upper 10—20 in. long, .2—2.5 in. wide; racemes 3—5, sometimes only 2, 1—2 in. long; lower glume of sessile spikelets .17—1.8 in. long, upper .18—2 in. long with a fine arista .27—3.3 in. long; awn of upper lemma .6—1 in. long; glumes and lower lemma of pedicelled spikelets aristate.....1. *ascinodis*.

Culms 3—24 in. high; leaves 1.5—5 in. long, .05—2 in. wide; racemes 2, second, .5—1 in. long; glumes of sessile spikelets .18 in. long, upper mucronate; awns of upper lemmas .5—6 in. long; glumes and lemmas of pedicelled spikelets mucicous.....2. *pumilus*.

Lower glume of sessile spikelets flat, .28—3 in. long, keels usually winged at the apex. Culms up to 40 in. high; leaves 3—8 in. long, .1—2 in. wide, more or less hairy; racemes 2, 1.6—3 in. long; upper glume of sessile spikelets .26—3 in. long, with an arista .16—2.2 in. long; upper lemma cleft to the middle with an awn .55—7 in. long; lower glume of pedicelled spikelets aristate

3. *longipes*.

Leaves tufted at the base of culms 7—36 in. high, at least the lower tapering to a very narrow, often elongate, almost petioled base, 1·8—8·5 in. long, ·08—·16 in. wide; racemes 1—3, 1·6—2 in. long; glumes livid or purple, lemmas white or reddish-purple; lower glume of sessile spikelets flat, usually with a shallow depression near the base, keels often narrowly winged, apex 2-toothed or -mucronate, ·25—·34 in. long; upper lemmas cleft to the middle, lobes very narrow, awn ·5—8 in. long; glumes and lemmas of pedicelled spikelets muticous, lower glume often narrowly winged at the apex.....4. *lividus*.

1. ANDROPOGON ASCINODIS, C. B. Clarke. *A. apricus*, Hook. f. non Trin.; F. B. I. vii. 169.
Ganjam District at Aska (Gamble); Coorg.
2. ANDROPOGON PUMILUS, Roxb.; F. B. I. vii. 170; S. I. G. figs. 150, 151.
In all the drier tracts; sea-level to 4,000 ft.
Often on black-cotton soil.
3. ANDROPOGON LONGIPES, Hack.; F. B. I. vii. 170.
Nilgiri Hills.
4. ANDROPOGON LIVIDUS, Thw.; F. B. I. vii. 209.
Nilgiri and Pulney Hills, at high elevations; Anaimudi Peak in Travancore at 8,840 ft. (Barnes).
In open downs often burnt over.

38. Cymbopogon, Hack.

Perennial, densely tufted, often aromatic herbs. *Leaves* flat, often very coarse. *Inflorescence* of paired racemes, usually one of them sessile, the other peduncled, subtended by a spatheole, terminating the culms and their branches, collected into a frequently much-branched panicle; rhachis fragile, several-jointed; spikelets 2-nate, one sessile, the other pedicelled, lowest pair of one or both racemes homogamous (♂ or empty), the rest differing in sex and more or less in shape; joints and pedicels filiform, their tips often more or less cupped or auricled, those of the lowest pair sometimes conspicuously swollen, oblong or barrel-shaped. *Sessile spikelets* (except the lowest one) dorsally, rarely laterally compressed: *Callus* very short, obtuse, shortly hairy. *Glumes* subequal, more or less chartaceous; lower flat, slightly depressed, narrowly grooved or broadly channelled on the back, 2-keeled at least from the middle upwards, keels usually narrowly winged; upper boat-shaped, 1-keeled, keel sometimes narrowly winged. *Lemmas* hyaline; lower entire empty; upper 2-fid or -lobed, awned from the sinus or entire and muticous, rarely firmer and stipitiform below the awn; column of the awn smooth; paleas 0, usually containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong, subterete or plano-convex; embryo half as long. *Pedicelled spikelets* differing more or less in shape and size from the sessile, never depressed or grooved on the back: *Glumes* muticous; lower chartaceous; upper thinner. *Lemmas* (usually the lower only present) hyaline, containing a ♂ floret, rarely both suppressed.

The following key is based on Dr. Stapf's in 'Kew Bull.', 1906, 350, and that of Melle. A. Camus in 'Rev. Bot. Appliq.', 1921, i, 271.

Spikelets awnless:—

Lower glume of fertile spikelets lanceolate, acute, back flat, 2-keeled, keels

narrowly winged, .16—18 in. long. Culms up to 5 ft. high; panicles pyramidal or linear-oblong.....1. *Nardus*.

Lower glume of fertile spikelets linear or linear-lanceolate, acuminate, back distinctly concave in lower half, .18—2 in. long. Very like the last species in other respects.....2. *citratus*.

Fertile spikelets bearing a slender, geniculate awn:—

Lower glume of fertile spikelets not channelled, at most slightly depressed or foveolate:—

Lowest pedicel not or hardly stouter than the rest; the longer leaves usually much narrowed to the base:—

Panicle often greyish, lax, with slender, long, flexuous, often drooping branches and comparatively inconspicuous spathes. Culms 3—6 ft. high; leaves 8—60 in. long, .1—8 in. wide; glumes .18—2 in. long, back of lower smooth or 1—2-foveolate.....3. *flexuosus*.

Panicle erect, dense, often interrupted, with rather conspicuous, frequently purplish-brown to blackish spathes. Otherwise hardly distinguishable from the last species, slightly more robust with rather shorter awns

4. *confertiflorus*.

Lowest pedicel of at least the sessile racemes much swollen, back convex, coriaceous. Culms 1—4 ft. high; leaves 6—25 in. long, .06—35 in. long, not narrowed to the base; panicles erect, narrow, often interrupted, hairs of joints and pedicels white, often conspicuously contrasting with the pale-brown spikelets; lower glume of fertile spikelets .15—2 in. long, its back flat or slightly depressed below the middle; awns .3—6 in. long.....5. *coloratus*.

Lower glume of fertile spikelets deeply channelled:—

Channel of glume in lower half, very narrow, corresponding to a rib on the inner side:—

Lowest pedicel of sessile racemes slightly swollen and connate to the base of the rhachis:—

Leaves linear-lanceolate, subcordate or amplexicaul, 3—18 in. long, .2—1.25 in. wide, finely caudate. Culms up to 6 ft. high; panicles 4—12 in. long, turning reddish (often very bright) when mature; glumes .13—16 in. long; awns .45—55 in. long.....6. *Martini*.

Leaves narrowly linear, not caudate or amplexicaul, 3—12 in. long, .15—3 in. wide. Culms up to 3 ft. high; panicles 4—8 in. long, glaucous or straw-coloured when mature; glumes .12—16 in. long; awns .3—7 in. long.....7. *caesius*.

Lowest pedicels not swollen, free from the rhachis. Culms 1—2 ft. high; leaves subcordate, finely acuminate, 2.5—8 in. long, .2—4 in. wide, often purplish near the base; panicles narrow, stiff, spathes often with rudimentary blades, purplish-brown with yellowish scarious margins; spikelets usually green in the lower part and purple in the upper; glumes .18 in. long; awns .4—5 in. long.....8. *polyneuros*.

Fertile glumes wedged between the rather stout joint and the pedicels, deeply channelled for most of its length and all its width between the keels, the channel ceasing abruptly a little above the base, which appears slightly humped, .15—16 in. long, not winged; awns .4—5 in. long. Culms slender, 6—25 in. high; leaves 1.5—15 in. long, .03—26 in. wide.....9. *Gidarba*.

1. CYMBOPOGON NARDUS, Rendle. *Andropogon Nardus*, Linn.; F. B. I. vii. 205: *A. Schoenanthus*, Wall. Pl. As. Rar. t. 28.

Only known in cultivation. Grown for its aromatic oil. The Citronella grass.

2. CYMBOPOGON CITRATUS, Stapf.

Occurring only as a cultivated plant grown for its aromatic oil. The Lemon grass. Vern. *Tel.* Vasana gaddi, Chippa gaddi, Nimma gaddi; *Tam.* Vasana pillu, Karpura pillu; *Mal.* Vasana pullu.

3. CYMBOPOGON FLEXUOSUS, Wats. *Andropogon Nardus*, Linn. var. *flexuosus*, Hack.; F. B. I. vii. 207.

- In all Districts from Bellary and Chingleput southwards, except on the W. Coast; W. Gháts. Also cultivated for the extraction of "Malabar lemon-grass oil." A white and a dark form are distinguished. The Ginger grass. Vern. *Tam.* Chukkunari pillu, Sukkunari pillu; *Mal.* Chukkunari pullu; *Kan.* Anthi balai.
4. CYMBOPOGON CONFERTIFLORUS, Stapf. *Andropogon Nardus*, Linn. var. *nilagiricus*, Hack.; F. B. I. vii. 206.
Rampa Hills (Narayanswami); W. Coast and Gháts; 3,000—6,000 ft. Vern. *Toda* Bambai.
5. CYMBOPOGON COLORATUS, Stapf. *Andropogon Nardus*, Linn. var. *coloratus*, Hook. f.; F. B. I. vii. 206.
In all Districts from Bellary and Nellore southwards except the W. coast; sea-level to 3,000 ft.
Used for thatch. Frequently deformed by a fungus, *Epichloe* sp. Vern. *Tel.* Botha gaddi; *Tam.* Manda pillu, Manakru pillu, Manjin pillu, Sengamani malai pillu, Sengana pillu; *Kan.* Badhai hullu, Karatha anjai hullu.
6. CYMBOPOGON MARTINI, Wats. *Andropogon Schoenanthus*, Linn. var. *Martini*, Hook. f.; F. B. I. vii. 204.
Eastern and Central Districts from Kistna and Bellary to Coimbatore and Salem; Mysore, Nilgiri and Pulney Hills; sea-level to 5,000 ft. The Geranium grass.
The source of Rusa oil, of which there are two kinds, *Motia* and *Sufia*, which though differing chemically appear to be derived from separate, morphologically indistinguishable races of this species. Sometimes cultivated. Vern. *Hind.* Rusa; *Tel.* Kachi gaddi; *Tam.* Kavattan pillu, Kannam pillu; *Kan.* Kasi hullu, Kunthi hullu, Anchet hullu, Nanj hullu, Bili dodda kachi hullu.
7. CYMBOPOGON CAESIUS, Stapf. *Andropogon Schoenanthus*, Linn. var. *caesius*, Hack.; F. B. I. vii. 205; S. I. G. fig. 164.
From Mysore State, Bellary and Kurnool Districts southwards, except on the W. Coast; 500—5,000 ft.
Used for thatching; eaten by cattle only when young. Vern. *Tel.* Kasi gaddi, Kamanchi gaddi; *Tam.* Kamakshi pillu, Mandap pillu, Muchival pillu; *Kan.* Kasi hullu, Kamancha hullu, Anji hullu.
8. CYMBOPOGON POLYNEUROS, Stapf. *Andropogon Schoenanthus*, Linn. var. *versicolor*, Hack.; F. B. I. vii. 205.
Nilgiri Hills; 3,000—7,000 ft.
9. CYMBOPOGON GIDARBA, Haines. *Andropogon Gidarba*, Ham. ex Hook. f.; F. B. I. vii. 208.
Mysore State; Vizagapatam, Cuddapah, Bellary, Nellore and Tinnevely Districts. Vern. *Tel.* Seetha Kasi gaddi, Thigavomi gaddi.

39. Hackelochloa, O. Kuntze

Annual, erect, much-branched, usually low herbs. *Leaves* linear. *Inflorescence* of axillary and terminal, often fascicled, cylindric, spiciform racemes; rhachis fragile, joints hollowed, completely fused with the pedicels. *Spikelets* 2-nate, dissimilar, one sessile, the other with a

pedicel fused to the joint. *Sessile spikelets* globose: *Callus* obconic. *Glumes* subequal; lower cartilaginous, subglobose; upper chartaceous, broadly ovate-oblong, lining the cavity of the joint. *Lemmas* hyaline; lower epaleate and empty; upper paleate, containing a bisexual floret. *Lodicules* 2, broadly cuneate. *Stamens* 3. *Grain* suborbicular; embryo $\frac{2}{3}$ as long. *Pedicelled spikelets* as long as the sessile or longer: *Glumes* equal, ovate, green; lower slightly asymmetrical; upper boat-shaped, prominently 1-keeled. *Lemmas* sometimes wanting, when present hyaline, empty or the upper containing a ♂ floret.

HACKELOCHLOA GRANULARIS, O. Ktz. *Manisuris granularis*, Linn. f.; F. B. I. vii. 159; Roxb. Cor. Pl. t. 118; S. I. G. fig. 147.

In all the central and eastern Districts and in the hills; usually in the drier tracts; sea-level to 4,000 ft.

Culms 1·5–30 in. high; leaves 1·2–7·5 in. long, 1–5 in. wide, hairy, base often cordate; racemes 2–7 in. long; lower glume of sessile spikelets 0·4–0·6 in. long, pitted.

A moderately good fodder. Vern. *Hind.* Trinpali; *Tel.* Kuru jedanai gaddi, *Guru* singu gaddi; *Kan.* Kadu sanna harka hullu.

40. *Ophiuros*, Gaertner f.

Erect, usually much-branched herbs. *Leaves* flat or convolute. *Racemes* spiciform, cylindric, terminal on the usually fascicled branchlets; rhachis horizontally or slightly obliquely fragile, joints completely fused with the pedicels to form deeply hollowed, cylindric recesses for the sessile spikelets. *Sessile spikelets* with a narrow callus fused to the base of the joint: *Glumes* equal; lower thickly coriaceous, nearly flat; upper thinly membranous, boat-shaped. *Lemmas* hyaline, paleate; lower containing a ♂ floret or empty; upper containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong, slightly compressed; embryo $\frac{1}{4}$ as long. *Pedicelled spikelets* entirely suppressed or rudimentary and minute.

OPHIUROS EXALTATUS, O. Ktz. *O. corymbosus*, Gaertn. f.; F. B. I. vii. 160. *Rottboellia corymbosa*, Linn. f.; Roxb. Cor. Pl. t. 181.

Mysore State and the Eastern Districts; sea-level to 3,000 ft. Culms up to 7 ft. high, base tuberous; leaves 4–12 in. long, 1·5–3 in. wide; racemes 1–4 in. long; lower glumes oblong, obtuse, 0·8–1·1 in. long, smooth or more or less pitted in rows. Used for thatching. Vern. *Tel.* Pedda panuku; *Tam.* Kinangu pillu, *Sothu* alagu pillu.

41. *Rottboellia*, Linn. f.

Annual, sometimes perennial, usually tall herbs, branched above, often with tilt-roots from the lowest nodes. *Leaves* large, broadly linear, flat. *Inflorescence* of solitary, slender, cylindric or very narrowly subulate, spiciform racemes; rhachis nearly horizontally to very obliquely fragile; joints fused with the usually shorter pedicels to form a deeply concave, thin-walled recess to receive the sessile spikelets. *Sessile spikelets* pale: *Glumes* subequal, coriaceous; lower slightly convex and closing the cavity; upper deeply boat-shaped. *Lemmas* hyaline,

paleate, nearly as long as the glumes; lower usually enclosing a ♂ floret; the upper a bisexual one. *Lodicules* 2. *Stamens* 3. *Grain* broadly oblong or ellipsoid, compressed; embryo nearly as long. *Pedicelled spikelets* usually shorter than the sessile: *Glumes* green, membranous or chartaceous. *Lemmas* hyaline, both or the upper only containing a ♂ floret or reduced and empty. Joints and spikelets in the upper part of the raceme more and more reduced and forming a tail-like appendage.

ROTTBOELLIA EXALTATA, Linn. f.; F. B. I. vii. 156. Roxb. Cor. Pl. t. 157; S. I. G. fig. 145.

In all Districts except in the driest localities; sometimes growing in water; sea-level to 7,000 ft.

Culms usually several feet, up to 12 ft., high, sometimes quite short; leaves up to 4 ft. long and 1'2 in. wide; racemes 2—6 in. long; joints 2—23 in. long; glumes 15—22 in. long, the lower of sessile spikelets often narrowly winged on both sides near the apex, upper glumes on the keel and the lower glume of pedicelled spikelets on one side. Vern. *Hind.* Barsali; *Tel.* Konda panuku.

42. *Manisuris*, Linn.

Annual or perennial low herbs. *Culms* usually tufted and branched. *Leaves* narrow, conduplicate, ultimately flat. *Racemes* solitary, terminal, compressed; rhachis fragile; joints fused with the pedicels to form a short, truncate, convex internode, hollowed on the inner face to receive the sessile spikelets, falling with the 2 spikelets. *Spikelets* 2-nate, one sessile, the other only appearing so by the fusion of its pedicel with the joint. *Sessile spikelets* dorsally compressed: *Glumes* dissimilar; lower coriaceous, smooth or more or less rugose, muricate or spinulose, its upper half 2-keeled and winged, often 1—2-awned; upper membranous or chartaceous, more or less boat-shaped and 1-keeled. *Lemmas* hyaline, usually paleate; lower empty or containing a ♂ floret; upper containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong; embryo as long. *Pedicelled spikelets* as long as the sessile: *Glumes* coriaceous or chartaceous, smooth, often aristate; lower 2-keeled and usually winged on one keel; upper 1-keeled and variously winged. *Lemmas* hyaline or absent or more or less reduced, when perfect sometimes the upper containing a ♂ floret.

Lower glume of sessile spikelets ovate, acute, not awned, margins winged, wings rounded above, usually narrowed at the middle and expanded at the base; 11—13 in. long, back smooth or shallowly transversely grooved, puberulous; glumes of the pedicelled spikelets muticous. Culms wiry, 6—28 in. high; racemes 1—3 in. long.....1. *Myurus*.

Lower glumes of all spikelets terminated by flat, single or paired and divaricate awns:—

Lower glume of sessile spikelets ovate, 13 in. long, tapering into an acuminate awn up to 36 in. long, its margins winged above the middle, wings narrowly lunate, backs with 3—6 transverse, sometimes slightly warted ridges; lower glume of pedicelled spikelets similar but winged on one side only and the back smooth. Culms slender, 3—12 in. high; leaves 1—3 in. long, very narrow; racemes 1—2 in. long.....2. *acuminata*.

Lower glume of sessile spikelets lanceolate, acute, 1—12 in. long, terminated by 2 divaricate, often unequal awns 22—27 in. long, margins winged, wings

acute below and tapering onto the base of the awns, back below 4—6-grooved, with 5—9 marginal hooked spinules, the back smooth or with spinules or sometimes the spinules fused into crenulate laminae; lower glume of pedicelled spikelets with an awn .27—.42 in. long, upper with an arista .1—16 in. long. Culms slender, 2—10 in. high; racemes .8—2.4 in. long.....3. *forficulata*.

1. *MANISURIS MYURUS*, Linn.; Roxb. Cor. Pl. t. 117. *Rottboellia Myurus*, Benth.; F. B. I. vii. 154; S. I. G. fig. 144.
Carnatic; Coimbatore, N. Arcot, Madura and Tinnevely Districts; usually in dry localities; low elevations to 2,000 ft. Vern. *Tel.* Nalla panuku; *Tam.* Waritsira pillu.
 2. *MANISURIS ACUMINATA*, C. E. C. Fischer n. comb. *Rottboellia acuminata*, Hack.; F. B. I. vii. 155.
Mysore State at Talguppa, 2,000—3,000 ft. (Meebold). On flat rocks.
 3. *MANISURIS FORFICULATA*, C. E. C. Fischer in Kew Bull. 1933, 355. *Rottboellia divergens*, Lisboa non Hack.; F. B. I. vii. 155.
Cochin State at Kavalay; 3,000—4,000 ft. (Meebold).
- Var. *hirsuta*, C. E. C. Fischer in Kew Bull. 1933, 357.
Glumes smaller, densely hirsute, hardly aristate.
Bababudan Hills (Meebold).

43. *Mnesithea*, Kunth.

Perennial erect herbs. *Leaves* narrow. *Inflorescence* of solitary, terminal, spiciform, cylindric racemes; rhachis fragile; joints fused with the pedicels into a terete internode deeply hollowed to receive the two sessile opposite spikelets, separated by a hyaline, often evanescent membrane. *Sessile spikelets* all alike: *Glumes* equal in size and shape; lower coriaceous, convex, closing the cavity; upper rather rigidly hyaline. *Lemmas* hyaline; lower resembling the upper glume, paleate or not, empty; upper oblong, its palea shorter, enclosing a bisexual floret. *Lodicules* 0. *Stamens* 3. *Grain* narrowly oblong, compressed; embryo $\frac{2}{3}$ as long. *Pedicelled spikelets* represented by minute rounded or truncate single glumes, rarely by 2.

MNESITHEA LAEVIS, Kunth; S. I. G. fig. 146. *Rottboellia perforata* Roxb. Cor. Pl. t. 182; F. B. I. vii. 158.

In all the east coast Districts; Mysore State; Shevaroy Hills; W. Gháts from the Nilgiri to the Travancore Hills; sea-level to 3,000 ft.

Culms 1—4 ft. high; leaves 1—20 in. long; .1—1.35 in. wide; racemes 2—8.5 in. long; joints .14—.18 in. long.

Eaten by cattle when young. Vern. *Tel.* Panuku, Kolupu gaddi; *Kan.* Sunku dabbai hullu.

44. *Hemarthria*, R. Brown

Erect or decumbent, perennial herbs. *Leaves* narrow, flat. *Racemes* spiciform, compressed, often curved, tips more or less subulate owing to the slender terminal spikelet, terminating the culms and their fascicled branches, subtended by a spathe; rhachis disarticulating tardily; joints semicylindric owing to their fusion with the pedicels, hollowed out to receive the sessile spikelets. *Sessile spikelets* closing the

cavity in the rhachis: *Glumes* subequal; lower nearly flat; upper boat-shaped, 1-keeled, sometimes adhering to the joint and pedicel. *Lemmas* hyaline, with or without paleas; lower empty; upper containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Grain* oblong, dorsally compressed. *Pedicelled spikelets* very like the sessile: *Glumes* usually more elongate; upper usually mucronate, caudate or aristate.

HEMARTHRIA COMPRESSA, Kunth. *Rottboellia compressa*, Linn. f.; F. B. I. vii. 153; Roxb. Cor. Pl. t. 156.

Godavari, Nellore and Chingleput Districts; usually in wet situations.

Culms 1—5 ft. high, decumbent and rooting below; leaves 1—5 in. long, 1—2 in. wide; racemes 2.5 in. long; lower glume of sessile spikelets 18—23 in. long, 2-keeled, margined or very narrowly winged at apex; upper glume of pedicelled spikelets sometimes narrowly winged on the keel near the apex. Vern. Tel. Shervu panuku.

45. Digitaria, Haller

Annual or perennial, slender herbs. *Leaves* narrow, flat, often flaccid. *Inflorescence* of 2—many digitate or more or less distant, alternate, opposite or whorled spikes or racemes, rarely paniculate; rhachis triquetrous, flat or terete with or without green wings. *Spikelets* usually 2—3-nate, jointed on the pedicels and falling from them entire. *Glumes* dissimilar; lower a minute membranous scale or delicate, evanescent, hyaline membrane or sometimes absent; upper membranous, sometimes very thin, rarely absent. *Lemmas* 2; lower 5—7-nerved, empty or with a minute palea and lodicules; upper chartaceous with hyaline margins, faintly 3-nerved; palea as long as and embraced by the lemma, finely 2-nerved, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed by the slightly hardened lemma and palea, oblong, plano-convex with rounded angles in section.

Racemes not in a pyramidal panicle with the lower opposite or whorled:—

Spikelets .09 in. or more long. Culms tufted from a geniculate, often rooting base:—

Hairs not clavate-tipped:—

Rhachis flat, up to .04 in. wide, margins winged. Culms up to 2.5 ft. high; leaves up to 10 in. long; racemes 2—14, subdigitate or 2—3-nate on a short common axis, up to 7 in. long, appressed, acutely acuminate; 1—14 in. long; lower glume very small or 0; barren lemma similar to the upper glume and like it with lines of fine appressed, ultimately spreading hairs between the nerves; grain oblong, whitish.....1. *marginata*. Rhachis trigonous, not winged. Culms up to 3 ft. high; racemes 5—13, alternate or opposite, sometimes more or less branched and subverticillate; spikelets 2-nate; upper glumes and barren lemmas more or less silky-hairy. Otherwise as in the last species.....2. *Griffithii*.

Hairs of upper glume and barren lemma clavate-tipped. Culms 6—24 in. high, rarely branched; leaves up to 9 in. long; racemes 2—7, subdigitate on a short common axis, up to 5 in. long; rhachis flat, narrowly winged; pedicels 2—3-nate, hispidulous, the hairs forming a tuft at the tips; spikelets elliptic-oblong, obtuse, .09—.11 in. long, appressed, subimbricate; lower glume 0; upper shorter than the lemmas, 3-nerved with 4 lines of clavate-tipped brownish hairs; barren lemma similar, somewhat shaggy with clavate-tipped

hairs; upper lemma soon becoming dark brown to black; grain ellipsoid, white.....3. *ternata*.

Spikelets .08 in. or less long:—

Hairs not clavate-tipped:—

Rhachis straight, flat, margins winged:—

Fruiting lemmas pale. Culms rising singly or in fascicles from a long creeping and rooting base, slender, 3—14 in. high; leaves .5—2.5 in. long; racemes 2 or 3, digitate, slender, .8—2.5 in. long; pedicels 2—3-nate, flexuous, tips discoid; spikelets elliptic-oblong, .05—0.7 in. long, appressed, subimbricate; lower glume 0 or rudimentary, upper delicate, nearly as long as the spikelet, finely pubescent; barren lemma 7-nerved, appressed-pubescent between nerves; grain ellipsoid, whitish.....4. *longiflora*.

Fruiting lemmas dark brown or black. Culms tufted, base not creeping, 2—20 in. high; leaves 1—4 in. long; racemes 2—5, up to 4 in. long, digitate or when more than 3, 2 or 3 from a lower level; spikelets .06—0.8 in. long. Otherwise as in the last species.....5. *chinensis*.

Rhachis flexuous, trigonous, capillary. Culms tufted, slender, 3—26 in. high; leaves finely acuminate, up to 15 in. long; racemes 3—10, alternate, spreading, sometimes branched, up to 4 in. long; pedicels 2—5-nate, some longer than the spikelets; spikelets elliptic-oblong, acute, .05—0.6 in. long, not imbricate; lower glume 0, upper thinly membranous, pubescent; fruiting lemma elliptic, dark brown, shining.....6. *pedicellaris*.

Hairs on upper glumes and barren lemmas short, clavate-tipped. Culms tufted, 6—24 in. high; leaves up to 6 in. long; racemes 3—15, erect, subdigitate or alternate, up to 4 in. long; rhachis trigonous, slender; pedicels sometimes as long as the spikelets, setulose at least at the apex; spikelets secund, broadly ellipsoid, .04—0.5 in. long; lower glume 0, upper sometimes reduced to a tuft of hairs or $\frac{1}{2}$ the length of the barren lemma; fruiting lemma black, longitudinally striolate.....7. *Royleana*.

Racemes in a pyramidal panicle, the lower opposite or whorled. Culms creeping below, 3—30 in. high; panicles 1.5—5 in. long, common axis slender, subterete; racemes many, up to 3.5 in. long, divaricate; rhachis capillary, usually naked for a short distance at the base; spikelets narrowly lanceolate, acuminate; upper glume and slightly shorter barren lemma several-ribbed, white appressed-hairy between the ribs.....8. *Wallichiana*.

1. DIGITARIA MARGINATA, Link. *D. sanguinalis*, Scop. var. *extensum*, Rang. et Tad., S. I. G. figs. 74, 75. *Paspalum sanguinale*, Lamk. var. *commutatum*, Hook. f.; F. B. I. vii. 15; ditto var. *extensum*, Hook. f.; F. B. I. vii. 15; ditto var. *Rottleri*, Hook. f.; F. B. I. vii. 16.

In all Districts; sea-level to 7,000 ft.

A good fodder. Vern. *Hind.* Takri takra; *Tam.* Arisi pillu, Akki pillu; *Kan.* Henu akkibu hullu.

Var. *fimbriata*, Stapf. *D. sanguinalis*, Scop. var. *ciliaris*, Rang. et Tad., S. I. G. figs. 71, 72. *Paspalum sanguinale*, Lamk. var. *ciliare*, Hook. f.; F. B. I. vii. 15. With the hairs of the mature spikelet spread out horizontally forming a rigid fringe on both sides, often mixed with thick-walled bristles from tubercular bases.

Distribution and vernacular names of the species.

2. DIGITARIA GRIFFITHII, Stapf. *D. sanguinalis*, Scop. var. *Griffithii*, Rang. et Tad., S. I. G. fig. 73. *Paspalum sanguinale*, Lamk. var. *Griffithii*, Hook. f.; F. B. I. vii. 15.

W. Gháts; 2,000—3,000 ft.

3. DIGITARIA TERNATA, Stapf. *Paspalum ternatum*, Hook. f.; F. B. I. vii. 17.

Bababudan, Nilgiri and Mysore Hills; Ramandrug; 3,000—8,000 ft. Vern. *Kan.* Bili akkabu hullu.

4. DIGITARIA LONGIFLORA, Pers. ; S. I. G. figs. 76, 77. *Paspalum longiflorum*, Retz. ; F. B. I. vii. 17 in part.
In all Districts ; sea-level to 6,000 ft. Vern. Tel. Pakuru gaddi ; Kan. Tapari hullu.
5. DIGITARIA CHINENSIS, Hornem. *Paspalum longiflorum*, Hook. f. non Retz. ; F. B. I. vii. 17 in part.
Ganjam, Godavari and Chittoor Districts ; Mysore State ; Nilgiri, Anaimalai and Pulney Hills ; 400—6,000 ft.
6. DIGITARIA PEDICELLARIS, Prain. *Paspalum pedicellare*, Trin. ; F. B. I. vii. 19.
In all Districts, except in the driest and wettest parts ; 2,000—6,000 ft.
7. DIGITARIA ROYLEANA, Prain. *Paspalum Royleanum*, Nees ; F. B. I. vii. 18.
Mysore State at Shimoga (Meebold) ; Ramandrug ; 2,000—3,000 ft. Vern. Kan. Bili akkabu hullu.
8. DIGITARIA WALLICHIANA, Stapf. *Paspalum Perrottetii*, Hook. f. ; F. B. I. vii. 20.
Bababudan, Nilgiri and Pulney Hills ; 4,000—7,000 ft.

46. Alloteropsis, Presl.

Annual or perennial, erect herbs. *Leaves* usually flat. *Racemes* spiciform, digitate or whorled, often compound. *Spikelets* solitary, twin or fascicled, more or less compressed dorsally, articulated on and falling entire from the pedicels. *Glumes* thinly membranous to chartaceous ; the lower the shorter ; the upper nearly as long as the spikelet and densely ciliate. *Lemmas* dissimilar ; the lower as long as or longer than the upper, its palea short, 2-fid or 2-partite, enclosing a ♂ floret ; the upper narrowed into a short mucro or an arista, its palea 2-nerved and 2-keeled with basal auricled flaps, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* elliptic-oblong to sub-orbicular, dorsally compressed, free within the hardened lemma and palea.

ALLOTEROPSIS CIMICINA, Stapf. *Axonopus cimicinus*, Beauv. ; F. B. I. vii. 64 ; S. I. G. figs. 107, 108.

In all Districts ; sea-level to 4,000 ft.

Culms up to 3 ft. high ; leaves lanceolate, base cordate, .5—4.25 in. long, .15—.7 in. wide, glabrous or more or less hairy from tubercles ; racemes few to many, 2—9 in. long ; spikelets .12—.15 in. long ; upper lemma mucronate or with an arista up to .13 in. long. Vern. Kan. Niru sajjai hullu.

47. Pseudechinolaena, Stapf

Annual herbs. Culms slender, erect from a prostrate rooting base. *Leaves* flaccid. *Panicle* simple ; racemes few, spiciform. *Spikelets* pedicelled, 2-nate or more often solitary with or without an accompanying reduced one, secund. *Glumes* herbaceous, subequal or the lower shorter ; lower nearly flat, 3-nerved, smooth or nearly so ; upper boat-shaped, gibbous below, 7-nerved with rows of transparent spots between.

naked or with short or long hooked hairs or bristles from the spots. *Lemmas* chartaceous; lower membranous at the margins and hyaline at a point at the base, oblong-lanceolate, laterally compressed, rounded on the back, as long as the spikelet, its palea more or less convolute, 2-nerved, empty or containing a ♂ floret; upper shorter, broadly lanceolate to oblong, back very convex, faintly 5-nerved, its palea similar, tightly clasped by the lemma when mature, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong, plano-convex, gibbous on the back at the apex.

PSEUDECHINOLAENA POLYSTACHYA, Stapf. *Panicum uncinatum*, Raddi; F. B. I. vii. 58.

W. Ghâts from Mysore to Travancore; 2,000—6,000 ft.

Culms 3—24 in. high; leaves ovate to linear-lanceolate, acuminate, 1—3 in. long, .17—.65 in. wide, more or less hairy or pubescent; panicles up to 7 in. long; racemes up to 2 in. long; spikelets obliquely ovoid, .14—.19 in. long; bristles when present up to .07 in. long.

48. *Eriochloa*, H. B. et K.

Annual or perennial erect herbs. *Leaves* more or less flat. *Inflorescence* racemously paniced; racemes peduncled or the upper sessile. *Spikelets* solitary or 2-nate, secund, ovate-lanceolate to oblong, acute or acuminate, sometimes finely, shortly aristulate, the base thickened into an annular callus, falling entire from the thickened apex of the pedicels. *Glumes* very unequal; lower reduced to a minute cupular rim clasping the callus; the upper membranous, corresponding to the outline of the spikelet, faintly 5-nerved, sometimes aristulate. *Lemmas* dissimilar; lower about equalling and resembling the upper glume, sometimes 2-keeled, empty or enclosing a ♂ floret; the upper chartaceous or almost crustaceous, faintly 5-nerved, with a fine barbelate mucro, its palea 2-keeled, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* dorsally compressed, free within its lemma and palea and the upper glume and lower lemma.

ERIOCHLOA PROCERA, C. E. Hubbard. *E. polystachya*, H. B. et K.; F. B. I. vii. 20; S. I. G. figs. 78, 79.

In all Districts; sea-level to 3,000 ft. Often in rice-fields.

Perennial; culms tufted, 1—5 ft. high; leaves up to 13 in. long, .15—.4 in. wide; racemes numerous, alternate, up to 4 in. long; spikelets .13—.15 in. long; upper glume and lower lemma finely white-silky, sometimes glabrescent in fruit.

Much liked by cattle. Vern. *Tam.* Tandambaran pillu, Mathanka pillu, Karungani pillu.

49. *Brachiaria*, Griseb.

Annual or perennial herbs. *Leaves* narrow, usually flat. *Inflorescence* of spiciform, sometimes branched racemes, sessile on a common filiform, triquetrous or more or less flattened rhachis, rarely paniced; pedicels solitary or twin. *Spikelets* elliptic- to ovate-oblong, more or less dorsally compressed, the convex side turned away from

the rhachis. *Glumes* dissimilar; the lower towards the rhachis and much shorter than the upper. *Lemmas* dissimilar; the lower subequal to and resembling the upper glume, its palea similar, with well-developed incurved flaps below the middle, usually enclosing a ♂ floret; the upper crustaceous or subcoriaceous, with firm, narrowly involute margins, its palea similar and almost as long, 2-keeled, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* broadly oblong or elliptic, more or less flattened, tightly enclosed in the more or less hardened lemma and palea.

Spikelets imbricate or approximate:—

Rhachis flat, margins scaberulous, often setulose; spikelets secund:—

Culms 3—30 in. high, slender, nodes glabrous, rarely puberulous; leaves .6—6.5 in. long, .15—4 in. wide; racemes 2—6, simple:—

Peduncle below the inflorescence more or less hairy; spikelets elliptic-obovate, acute or subacute, .1—12 in. long. Culms prostrate or straggling, 2—20 in. high; leaves .6—2.7 in. long, .15—3 in. wide; racemes 2—4, .9—1.7 in. long.....1. *distachya*.

Peduncle glabrous, rarely puberulous; spikelets elliptic or elliptic-oblong, acute, usually apiculate, .14—16 in. long. Culms usually erect, 12—30 in. high; leaves 3—6.5 in. long, .16—4 in. wide; racemes 4—6, 1—2.6 in. long.....2. *miliiformis*.

Culms 3—8 ft. high, robust, nodes villous; leaves 5—12 in. long, .3—7 in. wide; racemes numerous, 1—3.5 in. long, the lowest at least usually branched; spikelets lanceolate, acute, .12—13 in. long; pedicels usually setose; lower glume .05 in. long, upper .11—12 in. long.....3. *mutica*.

Rhachis trigonous or terete:—

Spikes erect, appressed to the rhachis, 6—11, .2—8 in. long. Leaves softly pilose from bulbous bases, .6—3.5 in. long, .07—22 in. wide, base rounded; spikelets secund, elliptic to broadly oblong, .07—09 in. long; lower glume .02 in. long, glabrous, upper .06 in. long, pilose, rarely glabrous...4. *eruciformis*.

Spikes erecto-patent or horizontal:—

Leaves lanceolate, base subcordate, clasping the culm, 1.7—6 in. long, .15—7 in. wide, glabrous or pubescent, spikes up to 2 in. long; spikelets not secund, broadly elliptic, acute or apiculate, .1—13 in. long; lower glume .04—07 in. long, upper broadly oblong, apiculate, .09—1 in. long, puberulous

5. *ramosa*.

Leaves ovate, base rounded, not clasping, .5—1.8 in. long, .18—55 in. wide, softly villous, margins markedly cartilaginous, often crisped; spikes .4—75 in. long; spikelets secund, elliptic-obovate, .08—095 in. long; lower glume .025—04 in. long, obtuse, upper obovate, obtuse, gibbous, .06—08 in. long, glabrous or puberulous; lower lemma longer than the glumes

6. *semiundulata*.

Spikelets distant; upper glume elliptic-oblong, glabrous:—

Upper lemma broadly stipitate. Culms erect, up to 8 ft. high; leaves ensiform from a narrowed, rounded base, finely acuminate, 4—9 in. long, .27—8 in. wide; spikes numerous, up to 3.5 in. long, lower often verticillate; rhachis usually more or less pubescent; spikelets elliptic, .14—15 in. long; lower glume .05—08 in. long, upper .11—13 in. long; upper lemma usually rugulose

7. *semiverticillata*.

Upper lemma subsessile. Culms weak, decumbent, 1—2 ft. high; spikes not verticillate:—

Leaves narrowly linear, glabrous or slightly puberulous at the narrow base, 2.5—8.5 in. long, .1—13 in. wide, margins and sheaths not ciliate; spikes usually numerous, up to 4 in. long; spikelets elliptic, .1—13 in. long; lower glumes .05—08 in. long, upper .1—11 in. long.....8. *remota*.

Leaves linear-lanceolate to lanceolate, base rounded or subcordate, usually sparsely bristly from bulbous bases, 2—6 in. long, .25—65 in. wide, margins usually ciliate from bulbous bases, at least near the base, sheaths ciliate; spikes usually few. Other characters as in the last species.....9. *Kurzii*.

1. BRACHIARIA DISTACHYA, Stapf. *Panicum distachyum*, Linn.; F. B. I. vii. 37; S. I. G. figs. 97, 98.
In all Districts; sea-level to 3,000 ft. Vern. Tel. Koranna gaddi; Kan. Hambu haraka hullu.
2. BRACHIARIA MILIIFORMIS, Chase. *Panicum distachyum*, Linn.; F. B. I. vii. 37 in part.
S. Kanara and N. Coimbatore Districts; Travancore. Vern. Kan. Kada samai hullu.
Very similar to the last species and often confused with it.
3. BRACHIARIA MUTICA, Stapf. *Panicum muticum*, Forsk.; F. B. I. vii. 34.
Shevaroy Hills (Perrottet); Tinnevely District at Mundanthorai (Barber) and Courtallam (Venkoba Rao).
A native of America and W. Africa, introduced and run wild here and there. An excellent fodder.
4. BRACHIARIA ERUCIFORMIS, Griseb. *Panicum Isachne*, Roth; F. B. I. vii. 28; S. I. G. figs. 80, 81.
In all Districts; sea-level to 6,000 ft.
A moderate fodder. Vern. Tel. Domakalu gaddi.
5. BRACHIARIA RAMOSA, Stapf. *Panicum ramosum*, Linn.; F. B. I. vii. 36; S. I. G. figs. 95, 96.
In all Districts; sea-level to 6,000 ft. Vern. Tel. Eduri gaddi; Kan. Kadu baragu hullu.
6. BRACHIARIA SEMIUNDULATA, Stapf. *Panicum villosum*, Lamk.; F. B. I. vii. 34.
W. Gháts; 5,000—7,000 ft.
7. BRACHIARIA SEMIVERTICILLATA, Alston. *Panicum semiverticillatum*, Rottl.; F. B. I. vii. 38.
Nilgiri, N. Coimbatore, Anamallai, Pulney and Tinnevely Hills; 1,500—6,000 ft. Vern. Kan. Manju hullu, Thapparakai hullu.
8. BRACHIARIA REMOTA, Haines. *Panicum remotum*, Retz.; F. B. I. vii. 38.
Ganjam District at Chatrapur (Fischer); Salem to Tinnevely Districts; Anamallai and Travancore Hills; sea-level to 3,000 ft.
9. BRACHIARIA KURZII, A. Camus. *Panicum Kurzii*, Hook. f.; F. B. I. vii. 38.
Rampa Hills (Narayanaswami).

50. Paspalum, Linn.

Perennial, sometimes annual herbs. *Leaves* narrow, flat or more or less inrolled. *Inflorescence* of solitary, digitate or racemose spikes; rhachis flat and winged or trigonous. *Spikelets* secund, 2-seriate, solitary or paired, sessile or nearly so, orbicular, oblong or ovate. *Lower glume* usually absent, rarely represented by a small scale; upper membranous, about equalling the spikelet, rarely shorter or absent, 3—more-nerved. *Lemmas* dissimilar; lower similar to the upper glume, empty; upper chartaceous to crustaceous, faintly nerved, its palea subequal, similar and embraced by it, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* more or less biconvex, tightly enclosed in the hardened lemma and palea.

Spikelets .09 in. or more long:—

Glume and lemmas glabrous; spikelets normally 2-ranked:—

Spikelets suborbicular or nearly so, obtuse, .09—13 in. long. Rhizome short; culms $\frac{1}{2}$ —3 ft. high, leaves glabrous, up to 18 in. long, .15—4 in. wide; racemes 2—5, rarely solitary, .8—5.8 in. long; rhachis broad, winged, with a median keel, produced at the apex into 2 short rounded or acute lobes; upper lemma and palca crustaceous, latter with wide membranous auricles at the base.....1. *scrobiculatum*.

Spikelets oblong to oblong-lanceolate, acute or subacute. Culms creeping and rooting below:—

Spikelets oblong, subacute, .1—13 in. long; upper lemma nearly as long as the spikelet. Culms up to 3 ft. high; leaves flat, up to 8.5 in. long, .15—25 in. wide, glabrous or more or less densely hairy; racemes 2—3, .8—3.5 in. long.....2. *orbiculare*.

Spikelets oblong-lanceolate, acute, .12—14 in. long; upper lemma $\frac{1}{4}$ — $\frac{1}{2}$ shorter than the spikelet. Culms up to 13 in. high; leaves flat or involute, .9—4.3 in. long, .07—16 in. wide, glabrous; racemes 2, very rarely 3, .5—2 in. long.....3. *vaginatium*.

Glume and barren lemma puberulous or hairy; spikelets normally 4-ranked:—

Racemes usually 7—9, 1.2—3 in. long; spikelets suborbicular, acute, .08—1 in. long. Culms erect, up to 4 ft. high; leaves up to 10 in. long, .15—3 in. wide; rhachis glabrous or nearly so, with setulose margins; glume and barren lemma minutely puberulous.....4. *longifolium*.

Racemes usually 3—5, 2—4 in. long; spikelets broadly ovate, acute, .4—16 in. long. Culms erect, up to 5 ft. high; leaves up to 10 in. long, .4—5 in. wide; rhachis hairy at the base, with minutely scabrid margins; glume and barren lemma sparsely silky, long white-ciliate.....5. *dilatatum*.

Spikelets .06—07 in. long:—

Racemes paired, rarely 3, 1.3—5 in. long; rhachis flat, margins cartilaginous and smooth or scaberulous; spikelets compressed plano-convex, subobtusely apiculate or shortly acute; glume ciliate with rather long white hairs, barren lemma glabrous. Culms erect from often very long rooting runners, up to 3 ft. high; leaves up to 8 in. long, .35—6 in. wide, glabrous.....6. *conjugatum*.

Racemes 6—20, alternate, .15—1 in. long; rhachis subtriquetrous, margins more or less bristly from tubercles; spikelets turgidly plano-convex, obtuse; glumes more or less ciliate with rigid hairs from tubercles; barren lemma more or less bristly. Culms 2—12 in. high; leaves .7—3 in. long, .2—65 in. wide; sparsely hairy on the ribs.....7. *compactum*.

1. *PASPALUM SCROBICULATUM*, Linn.; F. B. I. vii. 10; S. I. G. figs. 69, 70.

In all Districts; sea-level to 7,000 ft. Wild or cultivated. The wild form, which is generally smaller and more slender, is the var. *Commersonii*, Stapf.

The grain is used for food, but requires careful preparation as it is liable to act as a narcotic poison. The straw makes good cattle-fodder. Vern. *Hind.* Kodo; *Ur.* Khoddi; *Tel.* Arugu, Nita ari gaddi, Arikelu. *Tam.* Varagu, Karu varagu; *Kan.* Haraku hullu, Arikel.

2. *PASPALUM ORBICULARE*, Forst. *P. scrobiculatum*, Linn.; F. B. I. vii. 11 in part.

Ganjam, Nellore, Arcot and Coimbatore Districts; sea-level to 2,000 ft.

3. *PASPALUM VAGINATUM*, Sw. *P. distichum*, Linn.; F. B. I. vii. 12.

In sea-shore and river sand; near sea-level.

4. *PASPALUM LONGIFOLIUM*, Roxb. *P. scrobiculatum*, Linn.; F. B. I. vii. 11 in part.

Travancore.

5. *PASPALUM DILATATUM*, Poir.

A S. American fodder-grass; introduced and occasionally run wild.

6. *PASPALUM CONJUGATUM*, Berg.; F. B. I. vii. 11.

Mysore; Wynaad; Travancore; 500—4,000 ft.

7. *PASPALUM COMPACTUM*, Roth.; F. B. I. vii. 12.

Bababudan, Coorg, Nilgiri and Travancore Hills; 4,000—6,000 ft.

51. *Stenotaphrum*, Trin.

Perennial or annual, erect herbs, often creeping or prostrate at the base. *Leaves* flat, with compressed sheaths. *Panicles* spiciform, terminal or sometimes also from the upper axils; rhachis flat, continuous or jointed, bearing 1—8 spikelets sunk in hollows or chambers in its anterior face. *Spikelets* lanceolate to ovate-oblong, falling entire from rudimentary pedicels. *Glumes* 2, dissimilar; the lower smaller, sometimes scale-like; the upper nearly or quite as long as the spikelet, 5—11-nerved. *Lemmas* similar, chartaceous to coriaceous; the lower paleate or not, empty or containing a ♂ floret; the upper with a 2-keeled palea of similar texture, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free or nearly so. *Grain* broadly elliptic-oblong, plano-convex, closely embraced by, but free within the lemma and palea; embryo half as long.

STENOTAPHRUM DIMIDIATUM, Brogn. *S. glabrum*, Trin.; F. B. I. vii. 90.

Travancore State at Ambalapuzha (Ranga Achariyar). Rare. Culms erect from the root or from a slender rhizome, 5—13 in. high; leaves exactly linear, apex rounded, 1·3—3 in. long; 1·5—2 in. wide; panicle 1—3·6 in. long; rhachis alternately narrowly and broadly winged on one side and the other, the broader wing usually with an apical tooth and forming the hollow to receive the spikelet, spikelets 1·5—1·9 in. long; lower glume rounded, 0·5 in. long.

52. *Paspalidium*, Stapf

Perennial terrestrial or semi-aquatic herbs; culms often spongy below. *Leaves* flat or involute. *Inflorescence* of few to many spiciform, sessile or subsessile racemes secund on a common triquetrous rhachis. *Spikelets* ovoid to ovate-lanceolate, turgid or more or less compressed. *Glumes* dissimilar and unequal; the lower much the smaller, turned away from the axis. *Lemmas* dissimilar; lower similar to, but usually longer than the upper glume, margins inflexed, with or without a palea, containing a ♂ floret; the upper elliptic, crustaceous with firm, involute margins, its palea 2-keeled, of the same texture, almost as long, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed in the more or less hardened lemma and palea.

Spikelets ovoid or subglobose, hardly compressed, obtuse or acute, 0·9—1·3 in. long; lower glume broadly ovate or suborbicular, rounded, 0·5—0·7 in. long; upper glume acute, 0·7—1 in. long; lemmas 0·8—1·2 in. long, smooth. Leaves ciliate near the

base, 1—13 in. long, .1—4 in. wide; racemes usually, the lowest always, shorter than the internodes, distant .3—1.3 in. long.....1. *flavidum*. Spikelets ovate to ovate-lanceolate, acute or apiculate, distinctly flattened; lower glume broader than long, thinly membranous truncate, retuse or undulate, .03 in. long; racemes mostly as long as or longer than the internodes, the lowest sometimes shorter, imbricate, .3—1.6 in. long. Culms often spongy below:—

Upper glume broadly oblong, obtuse, .07 in. long; lower lemma acute or apiculate, .09—11 in. long; upper lemma .09 in. long, distinctly punctate. Leaves 2.2—9 in. long, .1—3 in. wide.....2. *punctatum*.

Upper glume broadly ovate, apiculate, .07—0.8 in. long; lower lemma apiculate, .08—0.9 in. long; upper lemma smooth. Leaves 7—12 in. long, .2—3 in. wide.....3. *geminatum*.

1. PASPALIDIUM FLAVIDUM, A. Camus. *Panicum flavidum*, Retz.; F. B. I. vii. 28; S. I. G. figs. 82, 83.

In all Districts; sea-level to 4,000 ft.

The spikes are sometimes reduced to 1—3 spikelets.

A good fodder. Vern. Hind. Sanka; Tel. Uda gaddi; Tam. Arisi pillu.

2. PASPALIDIUM PUNCTATUM, A. Camus. *Panicum punctatum*, Burm.; F. B. I. vii. 29.

In all the eastern Districts; sea-level to 600 ft. Often in water.

3. PASPALIDIUM GEMINATUM, Stapf. *Panicum paspaloides*, Pers.; F. B. I. vii. 30. *P. fluitans*, Retz.; S. I. G. figs. 84, 85.

In all Districts; sea-level to 3,500 ft. Often in water. Vern. Kan. Gaddai vadavina hullu.

53. Urochloa, Beauv.

Annual or perennial herbs. Leaves linear-lanceolate to ovate, flat. Inflorescence of several racemes sessile or subsessile on a common, more or less triquetrous, rarely strap-shaped axis with a straight or zig-zag keel on the anterior face; pedicels solitary or twin, 2—several seriate. Spikelets broadly ovate to lanceolate, more or less flattened or depressed, the convex side turned towards the axis, falling entire from the disc-tipped pedicels. Glumes membranous, usually very unequal; the lower the shorter, turned away from the axis; the upper either glabrous or more or less densely felted-pubescent. Lemmas dissimilar; the lower closely resembling the upper glume in all respects, empty or holding a ♂ floret; the upper crustaceous or subcoriaceous with narrow involute margins, elliptic-oblong, concave, obtuse and usually with a scabrid or barbellate mucro or cusp, containing a bisexual floret. Lodicules 2. Stamens 3. Styles 2, free. Grain tightly enclosed in the more or less hardened lemma and palea.

Spikelets .13—1.6 in. long; upper lemma distinctly cuspidate:—

Spikelets ovate to elliptic-oblong, acute. Culms up to 3 ft. high; leaves subcordate, clasping the stem, hairy or rarely nearly glabrous, ciliate from tubercles, 1.2—6.7 in. long, .2—7 in. wide; lower glume broadly ovate, clasping the base of the spikelet, acute or obtuse, .04—0.6 in. long; upper glume and lower lemma about the size and shape of the spikelet; upper lemma with a cusp .03 in. long

1. *panicoides*.

Spikelets lanceolate, acuminate. Leaves glabrous, 1.2—4.4 in. long, .3—85 in. wide. Other characters as in the last species.....2. *setigera*.

Spikelets ovate to elliptic, acute or apiculate, .07—0.9 in. long. Culms prostrate or creeping, rather slender, up to 20 in. long; leaves rounded at base, clasping the stem or not, glabrous or minutely pubescent, .5—3.5 in. long, .12—6 in. wide;

lower glume suborbicular, .02—.03 in. long; upper glume and lower lemma elliptic-ovate, acute; upper lemma broadly oblong, apiculate or mucronate, .06 in. long
3. *reptans*.

1. *UROCHLOA PANICOIDES*, Beauv. *Panicum javanicum*, Hook. f. non Poir.; F. B. I. vii. 35; S. I. G. figs. 1, 3, 4, 7, 93, 94.

In all Districts except the wettest; sea-level to 3,000 ft.

The grain is eaten by the poor. A good fodder. Vern. *Hind. Kuri*; *Tel. Salla wudu*; *Kan. Kadu billi samai hullu*.

2. *UROCHLOA SETIGERA*, Stapf. *Panicum setigerum*, Retz.; F. B. I. vii. 36.

Eastern and Central Districts from Kistna to Tinnevely; sea-level to 2,000 ft.

An excellent fodder.

3. *UROCHLOA REPTANS*, Stapf. *Panicum prostratum*, Lamk.; F. B. I. vii. 33; S. I. G. figs. 91, 92.

In all Districts except the wettest; sea-level to 6,000 ft.

The grain is eaten by the poor in times of scarcity. A good fodder much liked by cattle. Vern. *Tam. Shani pillu*.

54. *Echinochloa*, Beauv.

Annual or perennial, often tall herbs. *Leaves* narrow. *Inflorescence* of crowded panicles of loosely arranged, secund, spiciform branches bearing spikelets from the base or near it; rhachis triquetrous. *Spikelets* ovate to elliptic- or lanceolate-oblong, 2-nate or clustered, articulated on and falling entire from the pedicels. *Glumes* membranous, unequal; the lower much the shorter, mucronate, cuspidate or awned; the upper coincident in outline with the spikelet, acute, cuspidate or shortly awned. *Lemmas* dissimilar; the lower equalling the upper glume (excluding cusp or awn), its palea 2-keeled, empty or containing a ♂ floret; the upper subcoriaceous or crustaceous, ovate to elliptic-oblong, obtuse or apiculate, polished, very convex on the back, its palea as long, with rounded sides and flaps, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* broadly elliptic, plano-convex.

Racemes simple, rather distant, .3—1.25 in. long; lower glume and upper lemma about equal; obtuse, acute or cuspidate. Annual, up to 2 ft. high; leaves 2—8 in. long, .15—.45 in. wide, ligule 0; spikelets ovoid, .1—12 in. long; lower glume .04—.05 in. long, upper .09—.11 in. long; lemmas .08—.1 in. long, lower with a ♂ floret.....1. *colona*.

Racemes usually more or less branched, .8—2 in. long; lower glume and upper lemma cuspidate or awned, the latter the longer; lower lemma often awned:—

Annual, up to 3 ft. high; leaves 3—21 in. long, .2—.5 in. wide, ligule 0, junction of blade and sheath glabrous, usually marked by a brown zone; spikelets .15—.18 in. long; lower glume .07—.12 in. long, upper .15—.17 in. long; lower lemma empty, .14—.17 in. long, upper .12—.15 in. long; awn of lower lemma up to 2 in. long.....2. *crus-galli*.

Usually perennial, up to 6 ft. high; culms rooting and often branching from submerged nodes; leaves 3—18 in. long, .2—.4 in. wide, ligule a fringe of stiff hairs, sometimes absent on the uppermost leaf; lower lemma empty or with a ♂ floret. Otherwise as in the last species.....3. *stagnina*.

1. *ECHINOCHLOA COLONA*, Link. *Panicum colonum*, Linn.; F. B. I. vii. 32; S. I. G. figs. 89, 90.

In all Districts, except in the wettest localities; sea-level to 6,000 ft.

An excellent fodder. The grain is eaten by the poorer classes.

Vern. *Hind.* Sawank; *Tel.* Otha gaddi, Kaproda gaddi; *Tam.* Sawu, Sauri, Varsanum pillu, Karum pul.

Var. *frumentacea*, Blatt. & McCann. n. comb. *Panicum Crus-galli*, Linn. var. *frumentaceum*, Hook. f.; F. B. I. vii. 31. A taller and more robust plant with dense, sometimes corymbose panicles. Cultivated for its grain in most Districts. The straw is a valuable fodder. Vern. *Hind.* Shamula, Sanwa; *Ur.* Samu; *Tel.* Bonta shama, Pala oodalu, Sawa, Chamalu; *Tam.* Kudraivalli pillu, Rail pillu; *Kan.* Samai, Savai.

2. *ECHINOCHLOA CRUS-GALLI*, Beauv. *Panicum Crus-galli*, Linn.; F. B. I. vii. 31; S. I. G. figs. 6, 86, 87.

In most Districts; in rice-fields and other wet places; sea-level to 6,000 ft.

The grain is eaten by the poor. A good cattle-fodder and sometimes cultivated for that purpose. Vern. *Hind.* Sanwak; *Tel.* Pedda-wundu; *Kan.* Kadu dabhai hullu.

3. *ECHINOCHLOA STAGNINA*, Beauv.; S. I. G. fig. 88. *Panicum Crus-galli*, Linn.; F. B. I. vii. 31 in part.

In all Districts, in wet places, often partly submerged; sea-level to 3,000 ft.

Often confused with the last species. Vern. *Tel.* Bontha oodu; *Kan.* Kadu dabhai hullu.

55. *Oplismenus*, Beauv.

Annual or perennial herbs, usually decumbent and rooting at the base. Leaves thin, flat, ovate to lanceolate, often rather unsymmetrical. Inflorescence of simple or panicle racemes. Spikelets solitary or fascicled, secund. Glumes subequal, herbaceous or membranous, more or less keeled upwards, both or only the lower awned. Lemmas dissimilar; the lower similar to but longer than the glumes, muticous, mucronate or aristate, its palea perfect, reduced or absent, containing a ♂ floret or empty; the upper chartaceous to subcoriaceous, nearly as long as the lower, muticous, its palea as long as and embraced by the lemma, containing a bisexual floret. Lodicules 2, broadly cuneate, often very delicate. Stamens 3. Styles 2, free. Grain oblong, tightly embraced by the hardened lemma and palea.

Perennial; culms slender to rather robust, up to 3 ft. high; leaves .8—6.5 in. long, .25—1 in. wide; panicles up to 1 ft. long; racemes distant, few to many, sometimes reduced to sessile clusters of spikelets, up to 3 in. long; spikelets .12—1.8 in. long, awns needle-like, smooth, up to .43 in. long.....1. *compositus*. Annual; culms slender, up to 18 in. high; leaves .7—2.2 in. long, .2—5.5 in. wide; panicles up to 4 in. long; racemes distant or close, few, up to .7 in. long; spikelets .09—1 in. long, awns capillary, minutely scaberulous, up to .41 in. long

2. *Burmanni*.

1. *OPLISMENUS COMPOSITUS*, Beauv.; F. B. I. vii. 66. *O. undulatifolius*, Hook. f. non Beauv.; F. B. I. vii. 66.

In all Districts; sea-level to 7,000 ft. Common. Vern. *Tel.* Kodi juttu gaddi, Konda anthrika gaddi.

2. *OPLISMENUS BURMANNII*, Beauv.; F. B. I. vii. 68.

In all Districts; sea-level to 3,000 ft.

Much liked by cattle. A good hay-making grass. Vern. *Tam.* Mungil pillu.

56. *Ottochloa*, Dandy

Perennial herbs, creeping and rooting below, geniculate and scrambling above. *Leaves* narrow, flat, firmly papery. *Panicles* elongate, widely open or contracted; racemes more or less distant, short; rhachis and pedicels filiform. *Spikelets* usually in small, approximate or distant clusters, narrowly oblong, acute, dorsally compressed. *Glumes* 2, similar and subequal, firmly membranous, much shorter than the spikelet. *Lemmas* subequal; the lower membranous, the size and shape of the spikelet, empty; the upper subcoriaceous, margins very narrowly hyaline, its palea similar, embraced by it all along, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* elliptic, almost flat.

OTTOCHLOA NODOSA, Dandy. *Panicum nodosum*, Kunth; F. B. I. vii. 43.

Travancore State; at low elevations and up to 6,000 ft. (Meebold). Culms up to 6 ft. high; leaves narrowed and almost petioled or rounded or subcordate, 1·8—5 in. long, ·32—·5 in. wide; panicles up to 8 in. long, branches up to 5 in. long; spikelets ·13—·15 in. long.

57. *Holcolemma*, Stapf et Hubbard

Annual or perennial herbs. *Leaves* linear, flat. *Panicles* narrow, spiciform. *Spikelets* fascicled or solitary on a slender, simple rhachis, together with setae at the lower nodes or replaced by setae, oblong to lanceolate, back flat and deeply channelled. *Glumes* hyaline or thinly membranous; the lower $\frac{1}{2}$ — $\frac{1}{3}$ as long as the spikelet; the upper slightly longer. *Lemmas* dissimilar; the lower as long as the spikelet, base slightly saccate, membranous with a longitudinal median channel of thinner tissue, its palea as long, 2-keeled, concave and hyaline between the keels, empty or enclosing a ♂ floret; the upper as long as or slightly shorter than the lower, becoming crustaceous, finely granulate and transversely rugose, enclosing its similar palea except at the tip, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* elliptic-oblong, dorsally compressed.

HOLCOLEMMMA CANALICULATUM, Stapf et Hubb. *Panicum canaliculatum*, Nees; F. B. I. vii. 43.

Precise locality unknown (Wight).

Culms slender, weak, up to 4 ft. high; leaves flaccid, 3—6 in. long, ·1—·15 in. wide, finely acuminate; panicles 1·5—4 in. long; spikelets ·12—·14 in. long.

58. *Panicum*, Linn.

Annual or perennial, erect or procumbent, sometimes woody herbs. *Leaves* very diverse. *Inflorescence* of usually open panicles, generally

much divided. *Spikelets* lanceolate to oblong, elliptic or orbicular, rarely somewhat oblique, falling entire or nearly so. *Glumes* herbaceous; the lower rarely absent, sometimes hyaline, usually considerably shorter than the upper, seldom as long; the upper rounded on the back. *Lemmas* dissimilar; the lower similar and subequal to the upper glume, with or without a palea, empty or enclosing a ♂ floret; the upper coriaceous or crustaceous, obtuse or acute, mucous, margins usually involute, its palea similar, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed in the hardened lemma and palea.

Lower glume distinct, at least $\frac{1}{2}$ as long as the spikelet:—

Leaves linear:—

Leaves not markedly distichous, flat, not rigid or glaucous:—

Glumes equal, .07—11 in. long, obtuse. Culms 1—3 ft. high; leaves 2—3.2 in. long, .2—4 in. wide, closely ribbed; spikelets .08—12 in. long, upper lemma .06 in. long.....1. *oreades*.

Lower glume shorter than the upper:—

Spikelets .06—08 in. long. Culms 1—12 in. high; leaves 1—6 in. long, very narrow; lower lemma distinctly shorter than the upper glume, not much longer than the upper lemma.....2. *humile*.

Spikelets .085 in. or more long:—

Spikelets .2—26 in. long. Culms 1—4 ft. high, softly hirsute below the nodes; leaves tapering from a broad base, 4—14 in. long, .25—8 in. wide, sheaths with long spreading hairs from conspicuous tubercles; upper lemma ovate, .13—15 in. long, brown, shining, usually with 5 pale-brown nerves.....3. *miliaceum*.

Spikelets .16 or less long:—

Upper lemma smooth:—

Annuals; nodes of culms glabrous:—

Spikelets not gaping; keel of glumes not scaberulous; upper lemma acute or subacute:—

Panicles contracted, branches and pedicels moderately slender. Culms 1—2 ft. long; leaves tapering from a broad base, 3—12 in. long, .15—5 in. wide (in cultivated forms sometimes much larger, stout, up to 3 ft. high; leaves up to 2 ft. long and 1 in. wide); spikelets .13—17 in. long; lower glume .04—09 in. long; upper lemma .08—12 in. long, dark brown at maturity, often with 5 paler veins.....4. *miliare*.

Panicles effuse; branches and pedicels capillary. Culms slender, 6—22 in. high; leaves not tapering, 2—8 in. long, .25—35 in. wide; spikelets .1—12 in. long; lower glume .03—05 in. long; upper lemma .06—08 in. long, pale brown or whitish

5. *psilopodium*.

Spikelets gaping, .11—15 in. long; upper lemma obtuse, .07—11 in. long, yellow. Culms 6—36 in. high; leaves usually basal only, not tapering, 1.3—13 in. long, .12—4 in. long, copiously hairy from tubercles, rarely glabrous; panicles often large; lower glume .05—1 in. long, cuspidate, keel scaberulous...6. *trypheron*.

Perennials:—

Lower glume broader than long, obtuse, $\frac{1}{2}$ as long as the spikelets or less. Culms stout, 2—3 ft. high, base creeping or floating and rooting at the lower nodes, nodes glabrous; leaves tapering, 4—11 in. long, .25—4 in. wide, sheaths inflated; pedicels scabrid, usually much enlarged at the apex; spikelets lanceolate, .12—16 in. long.....7. *paludosum*.

Lower glumes ovate, acuminate, $\frac{1}{2}$ — $\frac{3}{4}$ as long as the spikelets. Culms solid, terete, woody below, up to 6 ft. high, nodes thickened, puberulous; leaves very finely acuminate, 6—24 in. long, .25—8

in. wide, sheaths not inflated; panicles large, pedicels slender, not enlarged at the apex; spikelets ovoid, acute, .12—.13 in. long

8. *antidotale*.

Upper lemma transversely rugulose, .08—.1 in. long. Culms usually stout, up to 10 ft. high; nodes hirsute; leaves tapering from a broad, rounded or cordate base, 6—24 in. long, .35—.8 in. wide, margins spinulose; lowest node of the panicle villous; spikelets .11—.16 in. long; lower glume suborbicular, .04—.06 in. long

9. *maximum*.

Leaves distichous, involute, seldom expanded, rigid, glabrous, 2.5—13 in. long, .15—.3 in. wide. Culms creeping at the base, stoloniferous, often nodular, 1—5 ft. high, sterile shoots closely leafy; spikelets .1—.13 in. long; lower glume suborbicular, .04—.05 in. long.....10. *repens*.

Leaves ovate to lanceolate:—

Spikelets .13 in. or less long:—

Leaves ovate, acute, base cordate, amplexicaul, 1—3.2 in. long, .5—1.2 in. wide. Culms decumbent and rooting below, up to 3 ft. long; spikelets .07—.09 in. long; glumes glabrous, puberulous or sometimes pilose from tubercles, upper gibbous, .06—.08 in. long, very slightly longer than the lower; lower lemma about as long, upper very little shorter than the lower glume.....11. *brevifolium*.

Leaves lanceolate, acuminate, base broad, deeply cordate, 3.5—8.5 in. long, .4—1.2 in. wide. Culms erect, up to 6 ft. high, base shortly woody; spikelets .1—.13 in. long; upper glume not gibbous, subequal to the lower lemma, a little longer than the lower glume and upper lemma

12. *montanum*.

Spikelets .16—.22 in. long. Culms slender, up to 5 ft. high; leaves ovate-lanceolate, acuminate, base rounded or cordate, 2.5—7 in. long, .35—.1 in. wide; upper glume and lower lemma subequal, larger than the lower glume and upper lemma.....13. *Gardneri*.

Glumes minute or one or both absent. Culms slender, up to 3 ft. high; leaves 2.5—8 in. long, .15—.53 in. wide; panicles large, effuse, branches and pedicels capillary; spikelets .1 in. long; lower lemma 5—7-nerved, glabrous or silky between the nerves, enfolding the slightly shorter upper.....14. *subglume*.

1. *PANICUM OREADES*, Domin *P. acquiglume*, Hook. f. non Hack. et Arehav.; F. B. I. vii. 44.

Nilgiri Hills at 5,000 ft. (Lawson, Bourne).

2. *PANICUM HUMILE*, Nees; F. B. I. vii. 48.

Vizagapatam and S. Kanara Districts; Travancore State.

Considered a good fodder in N. India.

3. *PANICUM MILIACEUM*, Linn.; F. B. I. vii. 45.

Cultivated for its edible grain. The common Millet.

The straw is a useful fodder. Vern. *Hind.* Chena; *Ur.* Rala; *Tel.* Varagalu, Wuragi, Warigalu, Barigalu; *Tam.* Samai, Kadai-kanni; *Kan.* Baragu.

4. *PANICUM MILIARE*, Lamk.; F. B. I. vii. 46.

Much cultivated in all Districts for its edible grain and run wild; sea-level to 7,000 ft. The little Millet.

The straw is a good fodder. Vern. *Hind.* Savan; *Ur.* Suniva; *Tel.* Chamalu, Ganga samalu, Sani, Savai; *Tam.* Samai, Shamai, Peru samai; *Kan.* Shamai, Bili samai hullu; *Mal.* Shama.

5. *PANICUM PSILOPODIUM*, Trin.; F. B. I. vii. 46.

In all Districts; sea-level to 6,000 ft.

Not easily distinguished from the last species, of which it is probably the truly wild form. In salt swamps the whole plant becomes rather stiff, with narrow erect leaves. Vern. *Tam.*

Kadaikanai, Piva pillu, Samai, Uragadam, Pattu pillu, Kalam pillu.

The spikelets are very commonly inhabited by a larva and then they become much hypertrophied, up to 3 in. long. In normal spikelets occasionally a coriaceous linear ensiform appendage $\frac{1}{3}$ — $\frac{2}{3}$ as long as the upper lemma is found attached to the rhachilla between the two lemmas.

6. *PANICUM TRYPHERON*, Schult. ; F. B. I. vii. 47 ; S. I. G. fig. 101.
In all Districts ; sea-level to 6,000 ft. Vern. *Tel.* Adavi satha gaddi ; *Tam.* Samai-karunai ; *Kan.* Kadu karai samai hullu.
7. *PANICUM PALUDOSUM*, Roxb. *P. proliferum*, Hook. f. non Lamk. ; F. B. I. vii. 50.
Ganjam, Cuddapah and Coimbatore Districts ; Mysore State ; Lower Pulney Hills ; Courtallam ; sea-level to 3,000 ft.
8. *PANICUM ANTIDOTALE*, Retz. ; F. B. I. vii. 52.
Bangalore ; Carnatic ; Nilgiri and Shevaroy Hills.
Grazed by cattle only when young. Used medicinally for ulcers (*vide* Koenig), and in throat affections ; the smoke when it is burnt is said to be a disinfectant. Vern. *Tam.* Nassiam pillu, Pinisu pillu.
9. *PANICUM MAXIMUM*, Jacq. ; F. B. I. vii. 49.
A tropical African grass cultivated for its valuable fodder and occasionally found as an escape. The Guinea grass. Vern. *Hind.* Gini ghans ; *Tam.* Ginio pillu ; *Kan.* Gini hullu.
10. *PANICUM REPENS*, Linn. ; F. B. I. vii. 49 ; S. I. G. figs. 102, 103.
In all Districts ; in sandy soil or in standing, including brackish, water ; sea-level to 7,000 ft. The Ginger grass.
Much liked by cattle and alleged to stimulate the yield of milk. Vern. *Ur.* Reda ; *Tel.* Ladda gaddi, Kari gaddi ; *Tam.* Tinci pillu, Inji pillu ; *Mal.* Inchi kanu pullu ; *Kan.* Sonti hullu.
11. *PANICUM BREVIFOLIUM*, Linn. *P. ovalifolium*, Poir. ; F. B. I. vii. 44.
In all Districts ; sea-level to 3,500 ft.
12. *PANICUM MONTANUM*, Roxb. ; F. B. I. vii. 53.
In all Districts ; sea-level to 4,000 ft.
13. *PANICUM GARDNERI*, Thw. *Isachne Gardneri*, Benth. ; F. B. I. vii. 26.
W. Ghâts ; 5,000—7,500 ft.
14. *PANICUM SUBEGLUME*, Trin. ; F. B. I. vii. 51.
In all the Eastern Districts from the Rampa Hills to Tinnevely ; sea-level to 2,000 ft.

59. *Hymenachne*, Beauv.

Stout, erect herbs. *Leaves* broadly linear. *Inflorescence* a thyrsoid panicle with erect, appressed branches ; branchlets spiciform. *Spikelets* very numerous, secund, narrowly lanceolate, acuminate, articulated on minute pedicels ; rhachilla produced between the glumes and between the upper glume and the lower lemma. *Glumes* membranous ; the lower shorter, cuspidate, keeled ; the upper sheathing the rhachilla, prominently 3-nerved, cuspidate or awned. *Lemmas* longer than the

upper glumes; the lower membranous, lanceolate, tapering into an arista, 5-nerved, empty; the upper shorter, oblong, membranous in flower, hardening in fruit, faintly 2-nerved, embracing its palea except at the tip, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* very small, oblong, tip contracted; embryo large, orbicular.

HYMENACHNE PSEUDO-INTERRUPTA, C. Muell. *Panicum Myurus*, H. B. K.; F. B. I. vii. 39.

Near the coast line; not common.

Root stock creeping or floating; culms erect, 2–6 ft. high, rooting at the lower nodes, spongy below; leaves 3·5–18 in. long, 3–75 in. wide, base rounded or cordate; panicle 4·5–12 in. long; spikelets 16–2 in. long; glumes and lower lemma scaberrulous on the ribs; upper glume strongly 3-ribbed, acuminate-caudate, 15 in. long; lower lemma 18–2 in. long, tapering into an arista $\frac{1}{3}$ as long; upper lemma 12–13 in. long.

60. *Cyrtococcum*, Stapf

Perennial, usually weak herbs. *Leaves* usually narrow, sometimes ovate, flat. *Panicles* effuse or contracted. *Spikelets* long- or short-pedicelled, distant or approximate, obliquely obovate to semi-obovate, much laterally compressed. *Glumes* thinly membranous, unequal or subequal. *Lemmas* dissimilar; the lower similar to the upper glume, its palea, if present, narrow, 2-nerved, empty; the upper narrowly boat-shaped, papery to subcrustaceous with firm, narrowly involute margins, as long as the lower or nearly so, its palea subequal to it, narrowly convex on the back, with fine keels and thin flaps, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* small, obovoid, free within the hardened lemma and palea.

Pedicels short, rarely as long as the spikelets:—

Leaves 5–17 in. long, 1–4 in. wide. Culms slender, creeping and branching below, up to 18 in. high; panicle up to 2·5 in. long, branches few; spikelets few, hispid, 06–07 in. long.....1. *trigonum*.

Leaves 2–7·5 in. long, 2–65 in. wide. Culms rather stout, erect from a creeping base, up to 3 ft. high; panicle 2·5–8·5 in. long, branches many; spikelets numerous, glabrous, rarely softly puberulous, 07–09 in. long.....2. *oxyphyllum*.

Pedicels long, usually longer than the spikelets:—

Upper lemma semi-ovate, with a linear or oblong apical pale callus, its palea usually with a small round apical callus; glumes more or less keeled:—

Lower lemma obtuse; glumes usually puberulous or hispidulous; panicles effuse, simply branched:—

Spikelets 09–1 in. long; upper lemma semi-ovate. Culms slender, erect from a creeping, rooting base, 5–12 in. long; leaves linear to linear-lanceolate, 1–4 in. long, 2–35 in. wide.....3. *patens*.

Spikelets 06–08 in. long; upper lemma broadly semi-ovate. Culms up to 18 in. high; leaves ovate to lanceolate, 1–3 in. long, 2–65 in. wide.

Other characters as in the last species.....4. *radicans*.

Lower lemma and glabrous glumes acute or cuspidate. Culms rather robust, up to 3 ft. high from a decumbent base; leaves 3–8 in. long, 25–6 in. wide; panicles up to 1 ft. long, fastigately branched; spikelets 08–09 in. long, less compressed than in any of the previous species.....5. *longipes*.

Upper lemma semi-lanceolate, acute, without apical callus, its palea without callus; glumes not keeled. Culms very slender, up to 18 in. high; leaves 1–2·7 in. long, up to 3 in. wide; panicles laxly effuse, branches and pedicels capillary; spikelets distant, 05–07 in. long.....6. *sparsicomum*.

1. CYRTOCOCCUM TRIGONUM, A. Camus. *Panicum trigonum*, Retz.; F. B. I. vii. 56.
In all Districts; up to 3,000 ft. Usually in shade. Vern. Kan. Abbu karkai.
2. CYRTOCOCCUM OXYPHYLLUM, Stapf. *Panicum pilipes*, Nees et Arn.; F. B. I. vii. 57.
In all Districts; sea-level to 6,000 ft. In open grass lands and woods and in evergreen forest.
3. CYRTOCOCCUM PATENS, A. Camus. *Panicum patens*, Linn.; F. B. I. vii. 57 in part.
Nilgiri, Pulney and High Wavy Mountains; 4,000—6,000 ft.
4. CYRTOCOCCUM RADICANS, Stapf. *Panicum patens*, Linn.; F. B. I. vii. 57 in part.
Mysore State; W. Coast and Gháts; N. Coimbatore Hills; sea-level to 6,000 ft.
Grazed by cattle. Vern. Kan. Akki hullu.
5. CYRTOCOCCUM LONGIPES, A. Camus. *Panicum longipes*, W. et A.; F. B. I. vii. 58.
Godavari District at Bison Hill (Barber); Mysore State; W. Coast and Gháts; 2,000—5,000 ft.
6. CYRTOCOCCUM SPARSICOMUM, A. Camus. *Panicum sparsicomum*, Nees; F. B. I. vii. 58.
Kodaikanal Ghát, about 2,000 ft. (Bourne).

61. Saccolipsis, Nash

Perennial, or sometimes annual herbs. *Leaves* linear, flat or convolute and filiform. *Panicles* effuse or contracted and spiciform. *Spikelets* often small, ovate oblong to conico-lanceolate, subterete or compressed, sometimes more or less oblique, usually somewhat turgid; pedicels filiform. *Glumes* unequal; the lower minute or up to half as long as the spikelet; the upper always very convex, often with a saccate base, 5—13-ribbed. *Lemmas* dissimilar; the lower about half as long as the upper, with a straight back, its palea hyaline, finely 2-keeled, sometimes reduced or rudimentary, empty or containing a ♂ floret; the upper very convex, chartaceous, becoming crustaceous, margins narrowly involute, obscurely 5-nerved, its palea of the same texture and almost as long, tightly embraced by it, hardly keeled, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* tightly enclosed in the hardened lemma and palea, elliptic, dorsally compressed, almost plano-convex in section; embryo about half as long.

Panicles cylindric, spiciform; pedicels short:—

Lower glume less than $\frac{1}{4}$ as long as the spikelet. Culms usually robust and spongy below, up to 6 ft. high; leaves 6—15 in. long, .2—5 in. wide; pseudo spikes 5—13 in. long (in impoverished individuals only 1 in. long); spikelets usually in interrupted, crowded fascicles, narrowly ovoid, .14—19 in. long, glabrous.....1. *interrupta*.

Lower glume half as long as the spikelet; pseudo spikes continuous, rarely interrupted:—

Spikelets ovoid, usually curved, .08—13 in. long, glabrous or more or less densely hispid. Culms slender, 4—24 in. high; leaves 1.2—5.6 in. long, .06—2 in. wide; pseudo spikes .35—3.5 in. long.....2. *indica*.

Spikelets subglobose, .06—08 in. long, glabrous. Culms slender, 6—22 in. high; leaves 4—14 in. long, .05—2 in. wide; pseudo spikes 1.4—10 in. long
 3. *myosuroides*.
 Panicles broad, effuse, up to 4 in. long; pedicels capillary, often longer than the spikelets. Culms slender, 6—20 in. high; leaves 1.5—4 in. long, .1—22 in. wide; spikelets gibbously ovoid, .09—11 in. long, glabrous.....4. *curvata*.

1. *SACCOLEPIS INTERRUPTA*, Stapf. *Panicum interruptum*, Willd.; F. B. I. vii. 40; S. I. G. figs. 99, 100.

In all Districts; sea-level to 6,000 ft. In swampy places.

Grazed by cattle. Vern. Tel. Wolam; Tam. Tandan pillu; Kan. Hodikai hullu.

2. *SACCOLEPIS INDICA*, Chase. *Panicum indicum*, Linn.; F. B. I. vii. 41. In all Districts; sea-level to 6,500 ft. Vern. Kan. Kari korlai hullu.

3. *SACCOLEPIS MYOSUROIDES*, A. Camus. *Panicum myosuroides*, R. Br.; F. B. I. vii. 42.

Ganjam District; Mysore State; Carnatic; sea-level to 3,000 ft. Doubtfully separable from the last species.

4. *SACCOLEPIS CURVATA*, Chase. *Panicum curvatum*, Linn.; F. B. I. vii. 42.

Chingleput and Tinnevely Districts; Travancore; up to 6,000 ft. In marshes and in hedges. A good fodder.

62. *Setaria*, Beauv.

Annual or perennial herbs. *Leaves* narrow, flat. *Panicles* terminal, contracted and cylindric with solitary or clustered spikelets on stunted branchlets which are more or less produced into bristles or divided into a one-sided involucre of bristles, or more or less open panicles with elongated branches and distant spikelets, the bristles present or not. *Spikelets* oblong to ovate, very convex on the back, falling entire, subtended by 1—many bristles. *Glumes* membranous; the lower usually ovate from a clasping base; the upper similar but longer. *Lemmas* dissimilar; the lower corresponding in size and shape with the spikelet, its palea elliptic-oblong, acute, sharply keeled or the keels marginate and narrowly winged, sometimes much reduced, empty or enclosing a ♂ floret; the upper subequal to the lower, very convex on the back or boat-shaped, crustaceous, often transversely rugose or finely pitted, its margins involute and embracing all along the similar palea up to its more or less prominent keels, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong or ellipsoid, tightly enclosed in the hardened lemma and palea.

Leaves plicate, 4—24 in. long, 4—3 in. wide. Perennial; culms erect from a woody rootstock, up to 8 ft. high; panicles usually long, contracted or expanded, up to 2 ft. long, sometimes reduced and subspiciform; branchlets usually ending in a bristle; spikelets ovate-lanceolate, acute or acuminate, .1—15 in. long; upper lemma faintly transversely striate.....1. *palmifolia*.

Leaves flat, not plicate. Annuals:—

Bristles barbellate with erect teeth:—

Upper lemma smooth or faintly transversely striate. Culms up to 5 ft. high; leaves tapering to a long fine point, 6—18 in. long, 4—1.4 in. wide; panicles dense, forming a cylindric, sometimes lobed, continuous pseudo spike up to 12 in. long; branches spiral or more or less whorled; bristles 2—6; spikelets subsistent, broadly oblong or elliptic, .08—11 in. long.....2. *italica*.

Upper lemma distinctly transversely rugose:—

- Panicles continuous, cylindric, 3—6.5 in. long; bristles about 8. Culms up to 40 in. high; leaves 2.5—13 in. long, .15—.4 in. wide; spikelets deciduous, ovate to elliptic-oblong; .09—.12 in. long.....3. *pallidifusca*. Panicles narrow, interrupted, lax, flexuous, 1.5—8 in. long, branches ending in a bristle, lower up to 1 in. long; involucre bristles 3—4. Culms slender, up to 3 ft. high; leaves flaccid, 2—12 in. long, .12—.7 in. wide; spikelets broadly ovate, .07—.08 in. long.....4. *intermedia*. Bristles barbellate with descending teeth. Culms up to 4 ft. high; leaves 3.5—14.5 in. long, .2—1 in. wide; panicles straight or curved, continuous, cylindric, .5—8 in. long; branches ending in a bristle; involucre bristles 1—4; spikelets oblong-ellipsoid, .07—.08 in. long.....5. *verticillata*.

1. SETARIA PALMIFOLIA, Stapf. *Panicum plicatum*, Lamk.; F. B. I. vii. 55.
In all Districts, especially in the hills; near sea-level to 6,000 ft.
2. SETARIA ITALICA, Beauv.; F. B. I. vii. 78.
Widely cultivated and occasionally found as an escape. The Italian Millet. Probably the cultivated form of *S. intermedia*, R. et S. Vern. *Hind.* Kangu; *Ur.* Kora; *Tel.* Kora, Koralu; *Tam.* Tenai; *Mal.* Tena; *Kan.* Kari biragu, Navanai.
3. SETARIA PALLIDIFUSCA, Stapf et Hubbard. *S. glauca*, Beauv.; F. B. I. vii. 78 in part.; S. I. G. fig. 109.
In most Districts; sea-level to 7,000 ft.
Panicles pale-yellow to reddish-brown. A fair fodder. Vern. *Hind.* Bandra; *Tel.* Nakka kora, Kuradakori gaddi, Nakka-toka gaddi.
4. SETARIA INTERMEDIA, Roem. et Sch.; F. B. I. vii. 79; S. I. G. fig. 110.
In all Districts; 2,000—6,000 ft. Vern. *Tel.* Arranki gaddi; *Kan.* Dodda anta purlai hullu, Kari ottai hullu.
5. SETARIA VERTICILLATA, Beauv.; F. B. I. vii. 80; S. I. G. figs. 111, 112.
In all Districts; up to 6,000 ft.
The grain is eaten by the poor; eaten by cattle before the spikes appear. Vern. *Tel.* Chik lenta; *Kan.* Sanna anta purlai hullu.

63. Pseudoraphis, Griffith

Floating or marsh herbs, usually elongate, much branched and rooting at the lower, geniculate nodes. Leaves narrow, flat. Panicles terminal, contracted or effuse, the branchlets produced beyond the uppermost spikelet. Spikelets narrow, obscurely articulated on the short pedicels, persistent. Glumes very unequal; the lower very small, thinly membranous; the upper as long as the spikelet or nearly so. Lemmas smaller and rather firmer than the upper glume; the lower containing a ♂ floret; the upper a bisexual or a ♀; paleas hyaline, cuneiform. Lodicules 2, sometimes only 1 in ♀ florets. Stamens 3, rudimentary in ♀ florets. Styles 2, shortly united at the base. Grain linear-oblong, compressed, free within the subcoriaceous lower and the hyaline upper lemmas.

PSEUDORAPHIS ASPERA, Pilger. *Chamaeraphis spinescens*, Poir.; F. B. I. vii. 62; S. I. G. fig. 104.

Kistna, Cuddapah, Coimbatore and Chingleput Districts; Mysore State; near sea-level to 4,000 ft. (Horsleykonda). Growing in tanks and marshes.

Culms up to 3 ft. long; leaves 1·2—3 in. long, ·1—·22 in. wide, scaberulous; panicles contracted, ultimately effuse, up to 4·5 in. long, branches flattened, undulate, scabrid, the prolongation usually overtopping the uppermost spikelet; spikelets distant, subulate, acuminate, ·23—·31 in. long; upper glume caudate.

64. *Rhynchelytrum*, Nees.

Annual or perennial herbs. *Leaves* linear or filiform, flat. *Panicles* compound or decompound, open or contracted, branches and pedicels capillary, the latter discoid and usually hairy or pubescent at the tips. *Spikelets* linear- to ovate-oblong, laterally compressed, often more or less gaping, usually clothed with soft, shining, often brightly coloured hair. *Glumes* usually separated; the lower minute or small, rarely $\frac{1}{2}$ as long as the spikelet; the upper as long as the spikelet or nearly so, emarginate or 2-lobed, rarely entire, mucicous, mucronate or aristate from the sinus. *Lemmas* dissimilar; the lower resembling the upper glume, usually aristate, its palea 2-keeled, usually containing a ♂ floret; the upper much smaller and not aristate, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong-ellipsoid, closely embraced by the lemma and palea.

RHYNCHELYTRUM VILLOSUM, Chiov. *Tricholaena Wightii*, Nees et Arn.; F. B. I. vii. 65.

Kurnool (Bourne) and Bellary Districts; Bangalore ("weed in a garden," Sedgwick); 1,000—3,000 ft.

Culms up to 2 ft. high; leaves 1—6 in. long, ·1—·25 in. wide; panicles up to 6 in. long; spikelets ·19—·24 in. long, excluding aristas; lower lemma 2-lobed, its arista ·07—·14 in. long with very long whitish or pinkish-purple hairs on the back.

65. *Pennisetum*, L. C. Rich.

Annual or perennial, erect, often tall, simple or branched herbs. *Leaves* narrow, flat or convolute. *Panicles* spiciform, usually dense, branches numerous, short and simple with a solitary spikelet or scantily divided and the spikelets in clusters of 2—5, the single ones or clusters subtended by and deciduous with an involucre of few to many, free, usually unequal, scabrid or plumose, simple, rarely branched bristles. *Glumes* usually small and hyaline; the lower sometimes suppressed; the upper rarely more than half as long as the spikelet. *Lemmas* similar and subequal or dissimilar and the upper smaller, membranous to chartaceous; the lower empty or enclosing a ♂ floret; the upper containing a bisexual floret; paleas subequal and similar to the lemmas, the lower sometimes suppressed. *Lodicules* 2, small or 0. *Stamens* 3; anthers sometimes penicillate at the tip. *Styles* 2, free or more or less connate. *Grain* narrowly oblong to orbicular, enclosed in the slightly hardened lemma and palea; embryo $\frac{1}{2}$ — $\frac{3}{4}$ as long.

Sometimes the spikelets are much reduced (especially in cultivated forms), even to an upper floret with only minute traces of a lower lemma.

Leaves expanded:—

Panicles cylindric, stout, 1·8—9 in. long; rhachis thick, villous; peduncles villous, ·05—·09 in. long; involucre densely packed all round the rhachis, often purplish, bristles sometimes ciliate, up to ·2 in. long. Culms stout, up to 6 ft. high; leaves 4—24 in. long, ·2—1·5 in. wide; spikelets 2, rarely 3, to an involucre, pedicelled, 13—17 in. long; lower glume usually 0, upper very short or 0; lemmas subequal, lower sometimes suppressed, ·12—14 in. long; anther-tips penicillate.....1. *typhoides*.

Panicles linear, slender, 1—8 in. long; rhachis slender, angled, flexuous, glabrous or puberulous; involucre sessile, spirally arranged at short intervals; spikelets usually solitary, rarely 2 in an involucre. Culms stout, up to 3 ft. high; leaves 3—15 in. long, ·2—6 in. wide; anthers not penicillate:—

Inner bristles densely villous, longest up to ·65 in. long; pedicels up to ·07 in. long; lower glume ·05—·07 in. long, more or less villous, upper ·15—·17 in. long, acute, puberulous; lower lemma like the upper glume, 3-toothed at apex, upper chartaceous ·09—11 in. long, its apex and that of its palea fimbriate.....2. *pedicellatum*.

Inner bristles laxly ciliate, longest up to ·5 in. long; spikelets sessile; lower glume minute or suppressed. Other characters as in the last species

3. *polystachyon*.

Leaves convolute, 3—30 in. long, very narrow; panicles linear; spikelets solitary, sessile; anthers not penicillate. Culms up to 3 ft. high:—

Panicles 3—7 in. long; involucre subsessile, bristles scabrid, not plumose, up to ·74 in. long, often purplish; spikelets ·27—·32 in. long; lower glume orbicular ·04 in. long, upper ovate, ·08—15 in. long; lower lemma ·24—·29 in. long

4. *Hohenackeri*.

Panicles 1—4·5 in. long; peduncles up to ·05 in. long; bristles plumose, up to 2·5 in. long, sometimes purplish; spikelets ·45—·55 in. long; lower glume oblate, ·02—·04 in. long, upper lanceolate to oblong, ·14—·2 in. long; lemmas 3—4 in. long.....5. *villosum*.

1. PENNISETUM TYPHOIDES, Stapf et Hubbard. *P. typhoideum*, Rich.; F. B. I. vii. 82.

Cultivated in all Districts for its edible grain and for fodder; here and there found as an escape; near sea-level to 7,000 ft. The Bull-rush Millet, Pearl Millet or Spiked Millet. Vern. Hind. Bajra; Ur. Gantiya; Tel. Sajja, Sajjalu, Gantelu; Tam. Kambu; Mal. Kampam; Kan. Sajjai.

2. PENNISETUM PEDICELLATUM, Trin.; F. B. I. vii. 86.
Godavari District (Barber).

3. PENNISETUM POLYSTACHYON, Schult. *P. setosum*, Rich.; F. B. I. vii. 87.
Godavari District (Barber).

4. PENNISETUM HOHENACKERI, Hochst. ex Steud.; *P. alopecuroides*, Steud.; F. B. I. vii. 84; S. I. G. figs. 113, 114.
Mysore State; Bellary, N. Arcot, Salem, Madura and Malabar Districts; Nilgiri and N. Coimbatore Hills; 1,000—6,000 ft. Vern. Tam. Munja pillu; Kan. Nosai hullu, Manai geddai.

5. PENNISETUM VILLOSUM, R. Br.

Introduced and run wild along road-sides at Ootacamund. *Pennisetum clandestinum*, Hochst., the Kikuyu grass, an excellent tropical African fodder grass, is being cultivated in certain areas to improve the grazing. It is reported to be a good lawn grass and is likely to spread.

66. *Cenchrus*, Linn.

Annual or perennial herbs. *Leaves* flat and flaccid or convolute, short and rigid. *Inflorescence* of simple spikes or paniced. *Spikelets* narrow, solitary or 2—3, rarely 4, enclosed in an involucre of bristles or spines thickened and united at the base into a cup and falling with it. *Glumes* unequal; the lower small; the upper hardly shorter than the spikelet. *Lemmas*, when both present, dissimilar; the lower empty, containing a ♂ floret or entirely suppressed; the upper more rigid, containing a bisexual floret. *Lodicules* 0 or 2, minute. *Stamens* 3. *Styles* 2, often shortly connate. *Grain* oblong, rather hard, enclosed but free within the lemma and palea.

Involucral bristles not spinose, .3—5 in. long, the inner plumose, even if thickened below the tips always filiform. Culms up to 18 in. high; leaves 2—12 in. long, .1—2 in. wide; spikes 1—3 in. long; lower glume .07—11 in. long, upper .1—13 in. long.....1. *ciliaris*.

Involucral bristles spinose, tips not filiform:—

Base of involucre rounded, bristles all erect, not ciliate, hairy within, up to .16 in. long. Culms up to 12 in. high; leaves 4—5 in. long, .15 in. wide; spikes .05—3 in. long; spikelets .17 in. long; lower glume .06—07 in. long, upper slightly longer; lemmas .13—16 in. long.....2. *setigerus*.

Base of involucre turbinate, bristles stout, the outer spreading or recurved, ciliate, up to .33 in. long. Culms 2—18 in. high; leaves 1—6 in. long, .2 in. wide; spikes 1.5—5 in. long; spikelets .22—26 in. long; lower glume usually suppressed, upper .14—2 in. long; lemmas .15—23 in. long.....3. *barbatus*.

1. *CENCHRUS CILIARIS*, Linn. *Pennisetum cenchroides*, Rich.; F. B. I. vii. 88; S. I. G. fig. 115.

Mysore State; Anantapur, Bellary, Chingleput, Salem, Coimbatore and Madura Districts; up to 3,000 ft.

Spikes often purple. An excellent fodder. Attempts are being made to extend it over wider areas. Vern. *Tam.* Kolukkattai pullu.

Var. *echinoides*, Hook. f. *Pennisetum cenchroides*, Rich. var. *echinoides*, Hook. f.; F. B. I. vii. 88; S. I. G. fig. 116. With rather stouter bristles united higher up into a more definite cup.

2. *CENCHRUS SETIGERUS*, Vahl. *C. biflorus*, Roxb.; F. B. I. vii. 89; S. I. G. fig. 117.

Coromandel. Not common.

Spikes sometimes purple.

3. *CENCHRUS BARBATUS*, Schum. *C. catharticus*, Del.; F. B. I. vii. 90; S. I. G. fig. 118.

Northern Circars; Bellary District.

Grazed by cattle before flowering.

67. *Isachne*, R. Br.

Perennial herbs. *Leaves* flat. *Inflorescence* loosely paniced. *Spikelets* small or minute, subglobose or obovoid, not or obscurely articulated on the pedicels. *Glumes* subequal, convex, herbaceous, often falling separately. *Lemmas* subequal or the lower longer and flatter, coriaceous paleate; the lower containing a ♂ or sometimes a bisexual floret; the upper articulated and often stipitate on the rachilla and falling separately, containing a bisexual or sometimes a

♀, rarely a ♂ floret. *Lodicules* 2, very minute. *Stamens* 3, rarely 4—6. *Styles* 2, free. *Grain* free within the hardened lemma and palea.

Glumes, at least the lower, longer than the lemmas, cuspidate or caudate:—

Lemmas subequal:—

Branches of the panicles glabrous or pubescent; margins of leaves thickened and cartilaginous; glumes lanceolate, sparsely setose at apex:—

Leaves ovate to ovate-lanceolate, .6—3.5 in. long, .2—5 in. wide (much wider in var. *latifolia*), base rounded and clasping the stem, sheaths more or less densely long-hairy and ciliate. Culms 3—12 in. high; glumes .1—11 in. long; lemmas .06—0.9 in. long, upper more or less puberulous

1. *Kunthiana*.

Leaves linear to linear-lanceolate, rarely a few narrowly ovate, .6—2.6 in. long, .15—4 in. wide, base narrowed, not clasping the stem, sheaths glabrous, rarely shortly puberulous. Culms 3—40 in. high; glumes .12—15 in. long.

Other characters as in the last species.....2. *Bourneorum*.

Branches of the panicles setose; glumes ovate-orbicular, .09—11 in. long; setose all over the back. Culms 1—5 in. high; leaves lanceolate, .7—2 in. long, .2—4 in. wide, base clasping the stem, margins neither thickened nor cartilaginous, sheaths long-hairy or nearly glabrous, long-ciliate; lemmas hemispheric, .06 in. long, glabrous.....3. *Lisboae*.

Lower lemma elliptic, .08—0.9 in. long, glabrous, upper broadly ovate, .04—0.6 in. long, rather densely pubescent. Culms slender, 1—5 in. high; leaves ovate to ovate-lanceolate, .4—1.2 in. long, .15—4 in. wide, sheaths lax, patently hairy from tubercles; glumes ovate, caudate-acuminate, 7-nerved, setose from large tubercles, .09—12 in. long, lower usually the longer.....4. *setosa*.

Glumes as long as or shorter than the lemmas:—

Spikelets .12 in. or less long:—

Leaves 6.5 in. or less long:—

Stems erect or prostrate, 25 in. or less high:—

Spikelets .07—12 in. long; ligules represented by a line of stiff hairs:—

Lemmas subequal and similar, ovate to elliptic-oblong, rather deeply concave, subcoriaceous, puberulous, .06—0.9 in. long. Culms decumbent, rooting below, up to 24 in. high; leaves asperulous, sometimes softly hairy, 2—5.5 in. long, .2—25 in. wide, usually more or less erect; glumes subequal, broadly ovate to orbicular, glabrous or asperulous and setose upward, .07—11 in. long.....5. *elegans*.

Lemmas markedly unequal and dissimilar, lower elliptic to oblong, shallowly concave, glabrous, membranous:—

Culms prostrate, slender, up to 12 in. long; leaves 1.2—2.3 in. long, .15—3 in. wide; glumes suborbicular or broader than long, .05—0.9 in. long, upper much more deeply concave, glabrous, sometimes asperulous and setulose at the apex; lower lemma as long, upper broadly ovate to suborbicular, semicircular in section, chartaceous, puberulous at least on the margins, .04—0.7 in. long.....6. *miliacea*.

Culms erect from a decumbent, rooting base, rigid, up to 12 in. long; leaves 1—2.5 in. long, .15—4 in. wide; glumes as in the last species; lower lemma .06—1 in. long, upper crustaceous, hard, usually white, puberulous at least on the margins, .05—0.8 in. long.....7. *dispar*.

Spikelets .04 in. long; ligules 0. Culms 1.5—7 in. high, very slender; leaves ovate, .35—1.5 in. long, .2—5 in. wide, flaccid; glumes delicately membranous, elliptic to elliptic-ovate, sparsely setose, .03—0.4 in. long

8. *gracilis*.

Culms straggling, bamboo-like, 4 ft. or more long; leaves 2—6 in. long, .12—25 in. wide, ciliate at base; glumes broadly elliptic-ovate, .08—1 in. long; lemmas boat-shaped, .07—0.8 in. long.....9. *Angladel*.

Leaves 7—14 in. long, .2—4 in. wide, continuous with the sheath, beset with stiff short or long hairs, margins thickened and cartilaginous. Culms erect, rigid, up to 3 ft. high; spikelets globose; glumes suborbicular, sparsely setose at apex, .08—1 in. long; lemmas orbicular, .06—0.7 in. long.....10. *Meeboldii*.

Spikelets .14 in. or more long. Culms often stout, 1—5 ft. high; leaves 2—11.5 in. long, .2—1 in. wide; glumes subequal, ovate to ovate-lanceolate, .14—2 in.

long, glabrous or setulose; lemmas subequal, boat-shaped, .12—.15 in. long, coriaceous.....11. *Walkeri*.

1. *ISACHNE KUNTHIANA*, W. et A.; F. B. I. vii. 21.

W. Gháts; High Wavy Mountains (Blatter and Hallberg); 5,000—8,000 ft.

- Var. *latifolia*, Hook f.; F. B. I. vii. 22. Leaves up to 1 in. wide with 2—4 nerves on either side of the midrib prominent below.

W. Gháts; 5,000—8,000 ft.

- Var. *nana*, C. E. C. Fischer n. var.

Culms only 1—2 in. high; leaves .1—25 in. long, .05—.1 in. wide, margins not cartilaginous; glumes longer than, equal to or rarely shorter than the lower lemma.

Travancore on Anaimudi Peak at 8,840 ft. (Barnes).

2. *ISACHNE BOURNEORUM*, C. E. C. Fischer in Kew Bull. 1932, 324.

Bababudan, Nilgiri and Pulney Hills; 5,000—8,000 ft.; Travancore on Anaimudi Peak at 8,840 ft. (Barnes).

3. *ISACHNE LISBOAE*, Hook. f.; F. B. I. vii. 22.

Bababudan Hills (Talbot, Meebold); 6,000 ft.

4. *ISACHNE SETOSA*, C. E. C. Fischer in Kew Bull. 1932, 247.

Cochin and Travancore States (Meebold); 3,000—6,000 ft.

5. *ISACHNE ELEGANS*, Dalz.; F. B. I. vii. 23.

Mysore, Nilgiri and Pulney Hills; 5,000—7,000 ft. Vern. *Kan. Kadu sanna samai hullu*.

6. *ISACHNE MILIACEA*, Roth; F. B. I. vii. 25.

Godavari District; W. Coast; at low elevations; usually in wet places.

7. *ISACHNE DISPAR*, Trin.; F. B. I. vii. 26. *I. australis*, Hook. f. non R. Br.; F. B. I. vii. 24.

In all Districts; sea-level to 6,000 ft.; often in wet situations. Readily eaten by horses and cattle. A troublesome weed in rice-fields.

- Var. *villosa*, C. E. C. Fischer n. var.

Nodes setose; leaves villous.

High Wavy Mountains (Blatter and Hallberg).

8. *ISACHNE GRACILIS*, C. E. Hubbard in Kew Bull. 1927, 77.

Bababudan Hills at Santaveri (Meebold); 4,000 ft.

9. *ISACHNE ANGLADEI*, C. E. C. Fischer in Kew Bull. 1932, 323.

Pulney and High Wavy Mountains; 4,000—6,000 ft.

10. *ISACHNE MEEBOLDII*, C. E. C. Fischer in Kew Bull. 1932, 323.

Mysore State (Meebold); 2,000—3,000 ft.

11. *ISACHNE WALKERI*, W. et A.; F. B. I. vii. 26.

W. Gháts; 2,500—7,000 ft.

68. *Thysanolaena*, Nees

Tall, reed-like shrubs with solid, terete culms. *Leaves* distichous, broad, flat. *Panicles* compound, large, effuse. *Spikelets* very numerous, linear-oblong, obscurely articulated on their pedicels. *Glumes* membranous, much shorter than the lemmas, the lower shorter than the upper. *Lemmas* similar; the lower without palea, empty; the upper

paleate, containing a bisexual floret. *Lodicules* 2. *Stamens* 2—3. *Styles* 2, free. *Grain* minute, enclosed in the hardened lemma and palea.

THYSANOLAENA MAXIMA, O. Kt. *T. Agrostis*, Nees; F. B. I. vii. 61.

Ganjam, Vizagapatam and Rampa Districts; 1,500—4,800 ft.

Culms up to 12 ft. high; leaves subcoriaceous, finely acuminate, cordate, up to 2 ft. long and 3 in. wide; panicle up to 3 ft. long and 2 ft. across; spikelets .07—.09 in. long; lower glume .02—.03 in. long, upper .04 in. long; lemmas lanceolate, boat-shaped, acuminate, .06—.07 in. long, the upper the shorter, ciliate with long spreading hairs.

69. *Arundinella*, Raddi

Annual or perennial, erect herbs. *Leaves* usually narrow. *Panicles* usually branched, rarely congested. *Spikelets* 1—2, rarely 3-flowered, not or imperfectly jointed at the base; rhachilla not produced beyond the uppermost floret, disarticulating above the glumes. *Glumes* membranous, chartaceous or thinly coriaceous, more or less convex; the lower usually much the shorter, 3—5-, rarely 7-nerved. *Lemmas* dissimilar; the lower usually boat-shaped, 3—7-nerved, its palea linear or oblong, 2-keeled, empty or enclosing a ♂ or a bisexual floret; the upper much shorter, usually chartaceous or crustaceous, articulated at the base and more or less separately caducous, involute, entire or 2-toothed, sometimes provided with two apical setae, usually long awned from the apex or sinus, the awn sometimes very short or absent, geniculate and hygroscopically contorting below the middle, the palea of similar texture, enclosed in the lemma, 2-keeled with wide inflexed flaps (palea sometimes lacking in either or both lemmas), containing usually a bisexual, seldom a ♀ floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free or very shortly united. *Grain* oblong or ellipsoid, free within the lemma and palea; embryo large; albumen rather hard.

Upper lemma awned, hairy at the base; glumes narrow:—

Upper lemma bearing 2 apical setae:—

Inflorescence congested into a crowded ovoid or oblong head .4—1.7 in. long. A weak annual 1—12 in. high; leaves linear to lanceolate, cordate, 1—2 in. long; lower glumes .16—.22 in. long, setose; upper lemmas .16—.22 in. long, pilose, awns .3—35 in. long, portion below the knee flat.....1. *avenacea*.

Panicle of distant spikes or effuse; leaves linear; upper lemma scaberulous:—

Spikelets mostly sessile or very shortly pedicelled, bifariously imbricate in spikes .2—1.5 in. long. Culms slender, 10—24 in. high; leaves 1.4—5.5 in. long, .05—.32 in. wide; panicles up to 5 in. long; glumes bristly from tubercles; upper lemmas .07—.15 in. long, awns .2—.35 in. long

2. *mesophylla*.

Spikelets slenderly pedicelled, not bifarious or imbricate. Culms slender to rather stout, 1—3 ft. high; leaves 3—11 in. long, .1—.3 in. wide; panicles 3—12 in. long; glumes glabrous or setose, ribs often scabrid; upper lemma .08—.12 in. long, awns .25—.37 in. long; setae .06—.14 in. long.....3. *setosa*.

Upper lemma devoid of setae:—

Spikelets small; upper lemma less than .06 in. long:—

Both glumes .07 in. or less long, smooth, glabrous or rarely with a few hairs. A slender annual 4—15 in. high; leaves 4—9 in. long, .15—.82 in. wide; panicles effuse, feathery, 5—8 in. long; upper lemmas .03—.04 in. long, scaberulous, awns .08—.11 in. long, very slender.....4. *pumila*. Glumes usually, upper always, more than .07 in. long, ribs of lower glume scabrid:—

Panicles compact, ovoid or oblong, rarely somewhat effuse, 1.6—8 in. long,

branches .3—1.5 in. long, spikelets crowded. Culms 1—12 in. high; leaves 1.5—7 in. long, .12—42 in. wide; lower glumes .07—13 in. long; upper lemma .04—06 in. long, scaberulous, awns .13—15 in. long

5. *holcoides*.

Panicles open, branches slender, spikelets not crowded:—

Culms very slender, 3—15 in. high; leaves aggregated near the base, distant above, with a naked peduncle to the panicle; leaves .5—1.3 in. long, .03—1 in. wide; rhachis, the 3—6 branches up to 1 in. long and the pedicels capillary; glumes more or less setose, lower .06—08 in. long, upper .1—12 in. long; upper lemmas .04 in. long, puberulous; awns very slender, .1—12 in. long.....6. *pygmaea*.

Culms more robust; leaves mostly more than 2 in. long and .07 or more in. wide:—

Glumes glabrous, lower .06—1 in. long, upper .1—13 in. long. Culms 3—20 in. high; leaves 1—12 in. long, .12—45 in. wide; panicles 2—20 in. long; upper lemmas .04—06 in. long, papillose, awns .1—11 in. long.....7. *Metzii*.

Glumes usually more or less setose, lower .08—11 in. long, upper .13—15 in. long. Culms 1—4 ft. high; leaves 2.5—13 in. long, .07—2 in. wide; panicles decompound, 7—20 in. long, branches slender, up to 6 in. long; upper lemmas .05—6 in. long, scaberulous; awns .16—2 in. long.....8. *Lavii*.

Spikelets larger; upper lemma .07 in. or more long, scaberulous; perennials:—

Panicles narrow, 2—7 in. long, branches spiciform, .5—1 in. long, rarely longer, distant or approximate, spikelets crowded subsessile, rhachis and branches densely villous. Culms 12—28 in. high; leaves mostly radical, flat, channelled or involute, stiff; more or less densely villous, rarely glabrous; glumes villous, lower .25 in. long, upper .28 in. long; upper lemmas .13 in. long; awns .18 in. long.....9. *villosa*.

Panicles effuse, branches long, spikelets pedicelled. Leaves glabrous:—

Branches of panicles distant; spikelets in distant pairs:—

Roots not tuberous, not woolly; culms 15—36 in. high; leaves 6—18 in. long; .32—45 in. wide; panicles 5—16 in. long, branches numerous, slender, up to 6 in. long, sometimes again branched; spikelets numerous, sometimes imbricate; lower glumes .12—15 in. long, ribs scabrid; upper .15—18 in. long; upper lemma .07—1 in. long; awns .11—12 in. long.....10. *nepalensis*.

Roots tuberous, densely woolly; culms slender, 6—33 in. high; leaves 4—8 in. long, .1—2 in. wide; panicles spreading, 4—9 in. long, branches few, distant, very slender, undivided, up to 5 in. long, pedicels long, capillary, spikelets few, distant; lower glumes .1—13 in. long, glabrous or scabrid on the ribs, upper .15—17 in. long; upper lemmas .07—1 in. long; awns .2—23 in. long, capillary.....11. *mutica*.

Branches of panicles close, spikelets crowded, rarely rather open with fewer and distant spikelets, 2.5—6 in. long. Culms 3—24 in. high; leaves 2.3—9.5 in. long, .15—6 in. wide; lower glumes .12—16 in. long, upper .16—21 in. long; upper lemmas .07—09 in. long; awns .15—18 in. long.....12. *fuscata*.

Upper lemma unawned, devoid of setae, without hairs at the base; perennials:—

Rootstock hairy; culms comparatively slender, 1—4 ft. high; leaves 3.5—15 in. long, .15—6 in. wide; panicles 3—13 in. long, branches 1—2.5 in. long; lower glumes .07—09 in. long, upper .1—11 in. long; upper lemmas .05—06 in. long, papillose.....13. *leptochloa*.

Rootstock glabrous; culms rather stout, 20—30 in. high; leaves rigid, 5—11.5 in. long, .3—6 in. wide; panicles 7—19 in. long, branches up to 6 in. long; lower glumes .08—12 in. long, upper .11—15 in. long; upper lemma .07—09 in. long, asperous.....14. *Lawsontii*.

1. ARUNDINELLA AVENACEA, Munro; F. B. I. vii. 69.

W. Ghâts; 2,000—7,500 ft.

2. ARUNDINELLA MESOPHYLLA, Nees; F. B. I. vii. 69.

W. Ghâts; 1,000—7,500 ft.

3. *ARUNDINELLA SETOSA*, Trin.; F. B. I. vii. 70. *A. nervosa*, Nees; F. B. I. vii. 70.

In all Districts; sea-level to 7,000 ft. Vern. *Tel.* Pathi oopagaddi; *Kan.* Hakki varji hullu, Maraga thattu hullu.

Var. *lanifera*, C. E. C. Fischer n. var.

Roots woolly and the setae of the upper lemmas only .02—.025 in. long.

Cuddapa District at Mogilikuppa (Gamble no. 21307), 3,000 ft.

4. *ARUNDINELLA PUMILA*, Steud. *A. tenella*, Nees; F. B. I. vii. 71.

W. Coast and Ghâts; Mysore State (Meebold); sea-level to 6,000 ft.

5. *ARUNDINELLA HOLCOIDES*, Trin. *A. agrostoides*, Trin.; F. B. I. vii. 71

Godavari District at Bison Hill (Barber); Cuddapah Hills (Beddome); Mysore State (Meebold); W. Ghâts; 2,000—6,000 ft. Vern. *Mal.* Molam pullu.

6. *ARUNDINELLA PYGMAEA*, Hook. f.; F. B. I. vii. 72.

S. Kanara at Pulicode.

7. *ARUNDINELLA METZII*, Hochst.; F. B. I. vii. 72.

Mysore State; S. Kanara and N. Malabar Districts; sea-level to 3,000 ft.

8. *ARUNDINELLA LAWII*, Hook. f.

Mysore at Sagar (Meebold); 2,000 ft.

9. *ARUNDINELLA VILLOSA*, Arn.; F. B. I. vii. 72.

Bababudan, Pulney and Tinnevely Hills; Attapadi Valley (Fischer); 2,000—7,000 ft.

10. *ARUNDINELLA NEPALENSIS*, Trin.; *A. brasiliensis*, Hook. f. non Raddi; F. B. I. vii. 73.

Mysore, Pulney and Travancore Hills; 3,500—7,000 ft.

11. *ARUNDINELLA MUTICA*, Nees. *A. capillaris*, Hook. f.; F. B. I. vii. 74.

Cuddapah and Nellore Districts; 300 to 3,000 ft.

12. *ARUNDINELLA FUSCATA*, Nees; F. B. I. vii. 74.

Mysore, Nilgiri, Anamallais and Pulney Hills; 3,000—7,000 ft. An excellent fodder.

13. *ARUNDINELLA LEPTOCHLOA*, Hook. f.; F. B. I. vii. 76.

W. Coast from N. Malabar District southwards; Tinnevely Districts; at low elevations.

14. *ARUNDINELLA LAWSONI*, Hook. f.; F. B. I. vii. 76.

Nilgiri Hills; 3,000 to 6,000 ft. In swamps.

70. *Avenastrum*, Jessen

Erect, usually perennial herbs. *Leaves* usually expanded. *Panicles* effuse. *Spikelets* erect, all alike, 2—8-flowered, not jointed on the pedicels; rachilla articulated at the base and between the lemmas. *Glumes* subequal or the upper longer, dorsally rounded or keeled; the lower 1—3-nerved; the upper 3—5-nerved. *Lemmas* all alike, lanceolate or ovate, usually deeply 2-cleft, sometimes 2-toothed or entire, bearing a geniculate awn with a twisted base from about the middle of the back; the lowest always long-awned, the upper ones with shorter awns

or awnless; paleas narrow, 2-keeled, keels ciliate, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* long, glabrous or hairy above the middle, free within the lemma and palea or adhering to the latter.

AVENASTRUM ASPERUM, C. E. C. Fischer n. comb. *Avena aspera*, Munro; F. B. I. vii. 277.

Nilgiri and Pulney Hills; 6,000—7,500 ft.

Culms up to 4 ft. high; leaves 1—18 in. long, .1—22 in. wide, glabrous or more or less pilose; panicles 3—12 in. long; glumes .26—.42 in. long, the lower 3-nerved; lowest lemma .37—.42 in. long, cleft to the middle; awns .5—.6 in. long.

Var. *Schmidii*, C. E. C. Fischer n. comb. *Avena aspera*, Munro var. *Schmidii*, Hook. f.; F. B. I. vii. 277.

Smaller and more slender; leaves mostly radical and more hairy; panicles smaller and more contracted with shorter branches; glumes .17—.27 in. long, lower 1-nerved; lowest lemma, .26—.3 in. long, entire; awns .32—.42 in. long.

Nilgiri and Pulney Hills; 7,000—8,000 ft.

Var. *polyneuron*, C. E. C. Fischer n. comb. *Avena polyneura*, Hook. f.; F. B. I. vii. 277.

Smaller than the typical species in culms and leaves; panicles very effuse with long spreading lower branches; glumes strongly nerved, .32—.5 in. long, lower 3-nerved; lowest lemma .44 in. long, cleft for about $\frac{2}{3}$ its length, awns .7 in. long.

Doddabetta in the Nilgiri Hills (Gamble); 8,000 ft.

71. *Avena*, Linn.

Annual erect herbs. *Leaves* usually expanded. *Panicles* effuse, contracted or spiciform. *Spikelets* all alike, 2—4-flowered, not jointed on the pedicels; rhachilla articulated at the base and sometimes between the lemmas. *Glumes* subequal or unequal, the lower usually the shorter, dorsally rounded or weakly keeled, broadly ovate or ovate-lanceolate, acute, 5—11-nerved. *Lemmas* all alike, ovate or lanceolate, 2-toothed or deeply 2-cleft, awned from the back below the cleft or awnless, sometimes only the lowest awned; awn geniculate with a twisted base; paleas narrow, 2-keeled, keels scabrid or ciliate, containing a bisexual floret. *Lodicules* usually 2. *Stamens* 3. *Styles* 2, free. *Grain* long, glabrous or hairy at the apex, free within the lemma and palea or adhering to the latter.

Species of this genus—the Oats—occur only as cultivated crops in the Nilgiri Hills and an occasional escape is met with. The following two species have been recorded:

Rhachilla and lemmas glabrous; upper lemmas usually awnless.....1. *sativa*.
Rhachilla hairy; lemmas hairy on the back below the middle; all the lemmas awned
2. *sterilis*.

1. *AVENA SATIVA*, Linn.; F. B. I. vii. 275.

2. *AVENA STERILIS*, Linn.

A more slender plant than the first.

72. *Coelachne*, R. Br.

Small, erect or trailing marshland herbs. *Leaves* short, flat, convolute or involute. *Inflorescence* of open, contracted or spiciform panicles or a single spiciform raceme. *Spikelets* all alike, sessile or pedicelled, not articulated, 2-flowered, both florets perfect or one or both unisexual, if both unisexual the upper ♀. *Glumes* subequal, membranous, orbicular or elongate. *Rhachilla* articulated above the persistent glumes, more or less elongate between the two lemmas, not produced above the upper. *Lemmas* dissimilar; the lower glabrous or nearly so, considerably longer than the upper, containing a bisexual or a ♂ floret; the upper coriaceous, more or less hairy, containing a bisexual or a ♀ floret; both paleate. *Lodicules* 2. *Stamens* 2—3. *Grain* fusiform or oblong, terete or plano-convex, free within the lemma and its palea.

Rhachis, pedicels and rhachilla terete. Nodes of culms pubescent; spikelets numerous; grain subterete, .03—.04 in. long:—

Panicles interrupted, spiciform, .4—3.5 in. long, branches appressed and congested or spreading and scattered, up to .35 in. long, usually shorter, bearing up to 9 ovoid spikelets. Culms erect or decumbent, 2.5—15 in. high; leaves usually flat, .4—17 in. long, filiform to .13 in. wide; glumes .04—.06 in. long, suborbicular; lower lemmas .06—.09 in. long, upper .04—.06 in. long, puberulous

1. *pulchella* var. *simpliuscula*.

Panicles open, 1—2 in. long, branches spreading, distant, up to .7 in. long, bearing 1—4 lanceolate spikelets. Culms erect, 4—6 in. high; leaves flat, .5—1.1 in. long, up to .06 in. wide; glumes .05—.08 in. long, ovate-oblong; lower lemma .1—.11 in. long, upper .07—.09 in. long, puberulous.....2. *perpusilla*.

Rhachis, pedicels and rhachillas flat. Culms very slender, flaccid, trailing, up to 18 in. long, nodes glabrous, flowering culms 2—4 in. high, unbranched; spikelets in pairs, one sessile and one pedicelled; glumes .11—.14 in. long, the lower ensiform, the upper oblong, concave; lower lemma .16—.17 in. long, upper .08—.09 in. long, broadly oblong, margins shaggily hairy; grain .06 in. long, plano-convex

3. *Meeboldii*.

1. *COELACHNE PULCHELLA*, R. Br.; F. B. I. vii. 271.

Var. *simpliuscula*, Hook. f.

Mysore, Nilgiri, Pulney and Travancore Hills; 2,000—6,000 ft.
Vern. Kan. Sanna purlai hullu.

2. *COELACHNE PERPUSILLA*, Thw. *C. pulchella*, R. Br. var. *gracillima*, Hook. f.; F. B. I. vii. 271.

Nilgiri Hills (Schmid).

3. *COELACHNE MEEBOLDII*, C. E. C. Fischer in Kew Bull. 1934, 169.
Cochin State at Chalakudi (Meebold). In tanks.

73. *Zenkeria*, Trin.

Perennial herbs. *Leaves* narrow, flat, convolute or involute. *Panicles* effuse or contracted; branches capillary. *Spikelets* all alike, 2-flowered, laterally compressed, not articulate on the pedicels; rhachilla very short, bearded, disarticulating above the glumes, not or very shortly produced beyond the upper lemma. *Glumes* subequal or the upper longer, 1-nerved, keeled, persistent. *Lemmas* equal and similar, chartaceous, longer than the glumes, usually hairy below the middle, several-veined; paleas shorter, broad, 2-keeled, long-ciliate, enclosing a bisexual floret. *Lodicules* 2, ovate, denticulate. *Stamens* 3. *Styles* 2, free. *Grain* narrowly oblong.

Culms 11—28 in. high; leaves flat or convolute, 2.5—28 in. long, .15—.3 in. wide, narrowed into a long stiff channelled quasi petiole; panicles 3—10 in. long, usually effuse; glumes .07—1 in. long; lemmas acuminate or caudate-acuminate, .14—2 in. long.....1. *elegans*.
 Culms 6—10 in. high; leaves rigid, erect, flat with involute margins, 4—12 in. long, .25—.3 in. wide, not narrowed into a quasi petiole; panicles 2.5—5 in. long, contracted; glumes .1—1.3 in. long; lemmas acute, .16—17 in. long.....2. *Stapfii*.

1. *ZENKERIA ELEGANS*, Trin.; F. B. I. vii. 270.

N. Arcot, Salem, Coimbatore and Tinnevely Districts. Nilgiri and Pulney Hills; 1,500—7,000 ft.

2. *ZENKERIA STAPFII*, Henr.

Nilgiri Hills (Perrottet).

74. *Arundo*, Linn.

Tall, stout, perennial shrubs, often woody below. *Leaves* broad, flat. *Panicles* large, decomposed; branches fascicled. *Spikelets* laterally compressed, not jointed on the pedicels, 2—8-flowered; rhachilla articulated at the base and between the lemmas. *Glumes* 2, persistent, subequal, narrow, acute or acuminate, keeled, 3-nerved. *Lemmas* lanceolate, entire and acuminate or 2-fid with an arista from the sinus, 3-nerved, long-silky hairy on the back below the middle; paleas hyaline, 2-nerved, each containing a bisexual floret. *Lodicules* 2, obovate. *Stamens* 3. *Styles* 2, free. *Grain* oblong.

ARUNDO DONAX, Linn.; F. B. I. vii. 302.

In most Districts except the W. Coast, usually near water; up to 2,000 ft.

Rhizome creeping; culms fistular, reed-like, up to 10 ft. high; leaves ensiform, amplexicaul, 8—24 in. long, .5—2 in. wide; panicles 9—24 in. long; glumes .25—.45 in. long; lemmas 2—4, the uppermost empty when more than 3, lowest .42—.46 in. long, silky pilose.

Not a good fodder though cattle will eat the young leaves. The stems are used in thatch-roofing.

75. *Neyraudia*, Hook. f.

Tall, perennial, leafy herbs or shrubs. *Leaves* flat or sometimes convolute. *Panicles* effuse, decomposed, often nodding. *Spikelets* laterally compressed, 4—8-flowered; rhachilla shortly bearded, jointed at the base or above the first lemma, in which case the latter is entire and empty, and between the lemmas. *Glumes* 2, membranous, subequal or the upper slightly the longer, keeled, 1-nerved. *Lemmas* elongate-subulate, often recurved, acuminate, entire or shortly 2-fid with 2 setae and an often recurved arista from the tip or the sinus, strongly 3-nerved, sides long silky-hairy; paleas short, oblong, 2-keeled, keels scaberulous, all containing a bisexual floret or the lowest empty and glabrous. *Lodicules* 2. *Stamens* 3. *Styles* 2. *Grain* linear-subulate, base acute, loose in the lemma.

NEYRAUDIA ARUNDINACEA, Henr. *N. madagascariensis*, Hook. f.; F. B. I. vii. 305.

Travancore at Devicolam (Meebold); 6,000 ft.

Culms solid, sometimes woody below, 2—8 ft. or more high; leaves 8—24 in. long, .2—1 in. wide; panicles up to 3 ft. high; glumes .08—.13 in. long; lemmas .14—.2 in. long.

76. Phragmites, Adans.

Tall, stout, perennial shrubs; rhizomes creeping, often very long; culms hollow, woody below, leafy nearly to the apex. *Leaves* flat. *Panicles* lax, usually large, decompound. *Spikelets* 3—10-flowered, linear, terete, slightly laterally compressed, not jointed on the pedicels; rhachilla long silky hairy above the lowest lemma, jointed between the lemmas, sometimes shortly prolonged beyond the uppermost. *Glumes* 2, persistent, membranous, unequal, oblong-lanceolate, 3-nerved. *Lemmas* much longer, the lowest linear-lanceolate, empty or containing a ♂ floret, the rest hyaline, narrowly subulate-lanceolate, caudate-acuminate, 3-nerved; callus long, densely long-silky hairy; paleas much shorter, 2 keeled, each containing a bisexual floret, the uppermost sometimes imperfect. *Lodicules* 2. *Stamens* 1—3. *Styles* 2, free. *Grain* oblong, terete.

PHRAGMITES KARKA, Trin., F. B. I. vii. 304.

In all Districts except the W. Coast; usually near water and often gregarious in large colonies; up to 3,000 ft.

Culms robust, sometimes up to 20 ft. high; leaves stiff, semi-erect, up to 25 in. long, .3—1.5 in. wide; panicles up to 25 in. long; lower glumes .12—.16 in. long, upper .22—.24 in. long; lemmas .36—.5 in. long.

The stems are made into pipes; split stems are plaited into mats. The culms and leaves are used for thatching.

77. Polypogon, Desf.

Slender, annual or perennial herbs. *Leaves* flat. *Panicles* spiciform or lobed, dense; rhachis fragile. *Spikelets* minute, uniform, crowded, laterally compressed, 1-flowered, articulate on the pedicels but persistent. *Glumes* 2, subequal, concave, keeled, entire or notched, with a slender arista from the sinus or from the back. *Lemma* much shorter, hyaline, broadly oblong, truncate, toothed, muticous or aristate; palea small, 2-nerved, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 1—3. *Styles* 2, free. *Grain* obovoid, free within the lemma and palea.

POLYPOGON MONSPELIENSIS, Desf.; F. B. I. vii. 245.

Bababudan Hills (Talbot).

Culms tufted, up to 2 ft. high; leaves 1—4 in. long, .1—.15 in. wide; panicles cylindric or oblong, .5—2 in. long; glumes .06—.08 in. long, scaberulous, aristas 2—3 times as long; lemmas .04—.05 in. long.

78. Aristida, Linn.

Annual or perennial, usually slender, tufted herbs. *Leaves* flat or more often convolute, very narrow. *Panicles* branched, contracted or effuse. *Spikelets* all alike, 1-flowered, slender, not articulated on the

short or long pedicels; rhachilla very short, disarticulating above the upper glume. *Glumes* narrow, keeled, 3-nerved, the lower usually considerably the shorter, but sometimes subequal or even longer, frequently aristate, sometimes 2-toothed. *Lemma* with a more or less bearded, usually pungent callus, narrow, involute, more or less cylindric, often attenuate at the apex, terminated by an awn usually consisting of 3 slender, hispidulous, usually subequal setae sessile on the lemma or supported by a short or long, usually twisted column, sometimes the 2 lateral setae shorter than the median or entirely suppressed, the median sometimes plumose, the lemma sometimes jointed at the middle or near the apex or just above the apex of the stamens; palea very narrow, short, embraced by the lemma, sometimes absent, the contained floret bisexual. *Lodicules* 2—3. *Stamens* 3. *Styles* 2, free. *Grain* narrowly cylindric or elongate-ellipsoid; embryo short or long.

Awn sessile; setae always 3, subequal:—

Glumes mucous. Culms slender, up to 2 ft. high; leaves 1.5—10 in. long; lower glume .14—23 in. long, upper .24—36 in. long; callus .02—03 in. long; lemma .23—44 in. long, keeled; setae .44—84 in. long.....1. *depressa*. *Glumes*, at least one, aristate; callus .05—08 in. long; glumes .4—7 in. long (including the aristas):—

Panicles contracted, 3—15 in. long; branches erect, straight, main axis terete, axils glabrous. Culms erect, 4—48 in. high; leaves up to 20 in. long; lemma .38—5 in. long; setae slender, 1—1.5 in. long.....2. *setacea*.

Panicles effuse, 3—9 in. long, branches spreading, flexuous, main axis angled, axils hairy or prominently tumid. Culms usually straggling and curved, up to 2 ft. high; leaves up to 10 in. long; lemma .32—35 in. long; setae rigid, rather wide at the base, 1—1.8 in. long.....3. *Hystrix*.

Awn supported by a column:—

Setae always 3, subequal:—

Lemma .17—23 in. long, elongate-fusiform, attenuate upwards, continuous with the .1—12 in. long column. Culms up to 14 in. high; leaves 1.5—3 in. long, glabrous; panicles usually contracted, 2—4.5 in. long; glumes shortly aristate, .2—32 in. long; callus .02—03 in. long; setae .55—8 in. long.....4. *mutabilis*.

Lemma .08—17 in. long, cylindric, truncate, articulated with the .6—1.4 in. long, scabrid column. Culms up to 2 ft. high; leaves 2.5—5 in. long, flat or convolute, glabrous or puberulous above, thinly pilose near the base; panicles narrow, lax, 1.5—7 in. long; glumes aristate, .7—9 in. long; callus .08 in. long; setae 1.8—2.4 in. long.....5. *funiculata*.

Setae often reduced to 1, .8—1.2 in. long, the lateral when present much finer, .3—4 in. long. Culms tufted, 6—24 in. high; leaves 4—12 in. long; panicle lax, often expanded, 3—12 in. long; glumes shortly aristate, .4—6 in. long, the upper often suppressed; callus .02—04 in. long; lemma .35—6 in. long, continuous and not perfectly articulated with the .38—5 in. long column.....6. *redacta*.

1. *ARISTIDA DEPRESSA*, Retz. *A. adscencionis*, Linn.; F. B. I. vii. 224 in part; S. I. G. figs. 171, 172.

In all but the wettest localities; up to 3,000 ft. Vern. *Tel.* Nari balana gaddi; *Tam.* Kodai balla pullu, Oosi pullu, Shigam pullu, Todapa puvada pullu; *Kan.* Kari sanna hanchi hullu.

2. *ARISTIDA SETACEA*, Retz.; F. B. I. vii. 225; S. I. G. fig. 173.

In all Districts; up to 3,000 ft.

Used for making brooms. Rejected by cattle. Vern. *Kan.* Dodda hanchi hullu, Nai anchi katti.

3. *ARISTIDA HYSTRIX*, Linn. f.; F. B. I. vii. 225; S. I. G. fig. 174.

In all Districts; up to 3,000 ft.

Said to be liked by cattle. Vern. *Kan.* Bili vunugada hullu.

4. *ARISTIDA MUTABILIS*, Trin. et Rupr.; F. B. I. vii. 226; S. I. G. figs. 175, 176.

Cuddapah, Nellore, Anantapur, Coimbatore and Tinnevely Districts; up to 1,400 ft.

5. *ARISTIDA FUNICULATA*, Trin. et Rupr.; F. B. I. vii. 226; S. I. G. fig. 177.

In all the Eastern Districts south of the Kistna River; up to 2,000 ft. Vern. *Tel.* Kundeti gaddi.

6. *ARISTIDA REDACTA*, Stapf.; F. B. I. vii. 227.

Bababudan Hills; Mysore State; Bellary and Kurnool Districts.

79. *Agrostis*, Linn.

Erect, usually perennial herbs. *Leaves* narrow, flat or slightly convolute. *Panicles* contracted or effuse, branches capillary, whorled. *Spikelets* all alike, 1-flowered, not jointed on the pedicels; rhachilla disarticulating above the glumes, not produced beyond the lemma. *Glumes* 2, equal or unequal, lanceolate, acuminate, keeled, muticous, 1-, rarely 3-nerved. *Lemma* shorter, hyaline, truncate, crenate or cleft, often awned on the back; callus short, glabrous or bearded with hairs less than half as long as the lemma; palea usually much shorter, often minute or 0; the contained floret bisexual. *Lodicules* 2. *Stamens* 3. *Grain* free within the lemma.

Lemmas glabrous; callus glabrous or very shortly hairy:—

Glumes .08—1 in. long, keel scaberulous; lemma .06—.08 in. long, 3-toothed or lobulate, awnless, palea 0—.05 in. long. Culms up to 3 ft. high; leaves 1.2—5.5 in. long, .08—.13 in. wide; panicles 3—12 in. long, effuse (contracted in var. *prorepens*).....1. *stolonifera*.

Glumes .11—.14 in. long; keels spinulose-ciliolate, at least in upper half; lemma .06—.1 in. long, rounded or truncate and minutely 2-toothed, bearing a geniculate awn .14—.16 in. long on the back close to the base, palea .06—.1 in. long. Culms 10—18 in. high; leaves 1.2—7 in. long, .05—.17 in. wide; panicles effuse, 5—12 in. long.....2. *peninsularis*.

Lemmas hairy; callus long hairy; palea 0; keels of glumes usually spinulose-ciliolate:—

Rootstock slender; culms 4—26 in. high; leaves 1—8 in. long, .03—.1 in. wide, base not narrowed; panicles effuse, 2.5—7 in. long; glumes .09—.13 in. long; lemma .07—.09 in. long, truncate, lobulate or minutely denticulate, awn .09—.16 in. long.....3. *pilosula*.

Rootstock stout, covered with the old sheaths; culms 8 in. high; cauline leaves few, 1—1.5 in. long, very slender, base not narrowed, radical leaves up to 4 in. long and .15 in. wide, narrowed into a rigid quasi petiole; panicles 1.5 in. long; glumes .13 in. long; lemma .09 in. long, truncate, 2—4-dentate, awn .18 in. long.

4. *Schmidtii*.

1. *AGROSTIS STOLONIFERA*, Linn. *A. alba*, Linn.; F. B. I. vii. 254.

Nilgiri and Pulney Hills; 6,000—7,000 ft.

Var. *prorepens*, Koch.

Rather smaller in all its parts; bearing stolons up to 1 ft. long; panicles contracted.

Nilgiri Hills; 7,000 ft.

2. *AGROSTIS PENINSULARIS*, Hook. f.; F. B. I. vii. 255.

Nilgiri and Pulney Hills; 6,000—7,000 ft.

3. AGROSTIS PILOSULA, Trin. *Calamagrostis pilosula*, Hook. f.; F. B. I. vii. 263.

Nilgiri and Pulney Hills; 3,000—8,000 ft.

4. AGROSTIS SCHMIDII, C. E. C. Fischer n. comb. *Calamagrostis Schmidii*, Hook. f.; F. B. I. vii. 264.

Nilgiri Hills (Schmid).

80. Garnotia, Bogn.

Erect, perennial, rarely annual herbs. *Leaves* flat or convolute. *Panicles* terminal, branches slender. *Spikelets* solitary or twin, articulated on the pedicels, very small, narrowly lanceolate, terete, 1-flowered; rhachilla not produced beyond the lemma. *Glumes* 2, subequal, lanceolate, acute, acuminate, cuspidate, or awned. *Lemma* narrowly lanceolate, entire or notched, awned, sometimes 3-awned, rarely muticous; awns straight or with a twisted base, sometimes geniculate or recurved, palea narrower, often auricled at the base; containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* linear or oblong, free within the lemma and palea; embryo about $\frac{2}{3}$ as long.

Culms tufted, nodes glabrous; leaves mostly basal, not articulated on the sheaths, margins of sheaths often woolly:—

Leaves complicate, glabrous, basal sheaths flattened, equitant; panicles contracted, usually very narrow, lemmas geniculately awned:—

Leaves flexuous, not stiff, 9—18 in. long, .1 in. wide, margins smooth. Culms slender, 6—20 in. high; panicles 2.5—10 in. long; glumes .19—22 in. long, with cusps .03—05 in. long; lemma .16 in. long, awn .4 in. long

1. *Schmidii*.

Leaves straight, rigid, often trigonous in section, 15—26 in. long, .1—15 in. wide, margins scabrid. Culms stout up to 3 ft. high; panicles 8—36 in. long; glumes .16—22 in. long, lower cuspidate, upper muticous; lemma .1—15 in. long, awn .22—28 in. long.....2. *scoparia*.

Leaves flat, pubescent below, narrowed into a long, silky quasi petiole, up to 34 in. long, .3—6 in. wide, sheaths not flattened or equitant, bristly. Culms stout, up to 3 ft. high; panicles up to 20 in. long, effuse; glumes muticous or very shortly cuspidate, .16—2 in. long; lemmas .13—16 in. long, awnless...3. *tectorum*.

Culms not tufted, nodes usually more or less hairy; leaves scattered, flat, articulate on the sheaths:—

Panicles contracted; branches suberect:—

Leaves narrowed to the base, 1—8 in. long, .1—4 in. wide, glabrous or pubescent. Culms often geniculate and rooting below, up to 3 ft. high; panicles 2.5—9 in. high; glumes .08—15 in. long, lower usually muticous, upper usually cuspidate; lemma .07—13 in. long, awn .26—35 in. long

4. *stricta*.

Leaves broad at the base, rounded or subcordate, 3—10 in. long, .36—1 in. wide, often short-hairy below. Culms up to 3 ft. high; panicles 5—12 in. long; glumes .1—12 in. long, both aristulate; lemma .09—12 in. long, awn .2—46 in. long.....5. *arundinacea*.

Panicles lax, 2.5—5.5 in. long; branches in distant fascicles, at length spreading. Culms slender, 3—20 in. high; leaves 1.5—3.5 in. long, .1—3 in. wide, narrowed to the base, pubescent; glumes .1—14 in. long, muticous, sometimes apiculate; lemma .09—11 in. long, awn .14—43 in. long.....6. *courtallensis*.

1. GARNOTIA SCHMIDII, Hook. f.; F. B. I. vii. 242.

Nilgiri Hills (Schmid, Lawson); 4,500 ft.

2. GARNOTIA SCOPARIA, Stapf ex Hook. f.; F. B. I. vii. 242. *G. tenuiglumis*, Stapf ex Hook. f.; F. B. I. vii. 242.

In most localities except the wettest; up to 7,000 ft.

3. *GARNOTIA TECTORUM*, Hook. f.; F. B. I. vii. 242.
Anamallai Hills (Beddome); Travancore State at Devicolam (Meebold); 6,000 ft.
4. *GARNOTIA STRICTA*, Brogn.; F. B. I. vii. 243.
Mysore State, W. Coast and Ghâts; sea-level to 4,000 ft. Sometimes epiphytic.
5. *GARNOTIA ARUNDINACEA*, Hook. f.; F. B. I. vii. 243.
W. Ghâts; up to 6,000 ft. Vern. Kan. Dobrai hullu.
6. *GARNOTIA COURTALENSIS*, Thw.; F. B. I. vii. 244.
Nilgiri, Pulney and Travancore Hills; 6,000—7,000 ft.

81. *Trachys*, Pers.

Annual, diffuse or erect herbs. *Leaves* flat. *Inflorescence* of a solitary spiciform raceme or more usually 2—3 radiating from the apex of a long peduncle; rhachis rigid, flat, broad, jointed, bearing on the underside of each joint shortly peduncled clusters of 1—6 sessile spikelets mixed with small, scale-like, rigid, flowerless glumes. *Spikelets* subglobose. *Glumes* dissimilar; the lower small, coriaceous; the upper elongate, membranous, 3—5-nerved. *Lemmas* dissimilar; the lower broadly ovate to ovate-oblong, rigidly coriaceous, 9- or more-nerved, its palea minute, empty; the upper smaller, chartaceous, ovate-lanceolate to linear-oblong, its palea as long, containing a bisexual floret. *Lodicules* 2, very minute or 0. *Stamens* 3. *Styles* 2, free. *Grain* oblong, compressed, free within the lemma and palea.

TRACHYS MURICATA, Steud. *T. mucronata*, Pers.; F. B. I. vii. 96; S. I. G. fig. 121. *Panicum squarrosus*, Retz.; Roxb. Cor. Pl. t. 206.
In all but the wettest localities, often in sea-shore sand.

Culms diffuse and rooting below or erect and up to 2 ft. high; leaves 1—6·5 in. long, 1—·5 in. wide, more or less softly-villous; racemes 5—2·5 in. long, rhachis 12—17 in. wide, its midrib stout; lower glume 07—11 in. long, upper 13—14 in. long; lower lemma 21—24 in. long, 9—13-nerved, upper 15—16 in. long.

82. *Tragus*, Haller

Annual or perennial, small, rigid, decumbent or erect herbs. *Leaves* short, flat. *Raceme* spiciform, solitary, terminal. *Spikelets* sessile in deciduous clusters usually of 2 facing each other, seldom 3 and very rarely 4 or 5, not or obscurely articulated on a short peduncle, 1-flowered. *Glumes* 2 or the lower suppressed; the lower when present minute, hyaline; the upper narrowly lanceolate, concave, acuminate, 5-ribbed, ribs armed with hooked spinules. *Lemma* solitary, thinly chartaceous, lanceolate, its palea as long, enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* linear-oblong, free within the lemma and palea.

TRAGUS BIFLORUS, Schult. *T. racemosus*, Hook. f. non All.; F. B. I. vii. 97; S. I. G. figs. 122, 123.

In all but the wettest tracts; often in sandy localities; sea-level to 3,000 ft.

Culms 2—8 in. high; leaves rigid, glaucous, glabrous, margins stiffly ciliate, 4—2 in. long, 1—15 in. wide; racemes 7—2·8 in. long; upper glume 16—18 in. long, sometimes purple, white and semi-transparent between the ribs, lemma 1—11 in. long, puberulous.

83. *Lopholepis*, Dcne.

Tufted, erect herbs. *Leaves* small, flat. *Racemes* spiciform, simple, terminal. *Spikelets* minute, 1-flowered, shaped somewhat like the head of a bird, jointed but persistent on the short pedicels. *Glumes* coriaceous; the lower incumbent on the upper, consisting of a globose base and a cymbiform limb, keel with a narrow cartilaginous wing, pectinately ciliate with spinules hooked at the tip; the upper lanceolate, acute, similarly keeled. *Lemma* hyaline, minute, broadly oblong, its palea broad, hyaline, containing a bisexual floret. *Lodicules* 0. *Stamens* 3. *Styles* 2, free. *Grain* subulate, concave in front, base gibbously incurved, free within the rigid glumes.

LOPHOLEPIS ORNITHOCEPHALA, Steud.; F. B. I. vii. 98.

Nilgiri (F. Foulkes) and Madura Hills; Madura and Tinnevely Districts and Travancore near the coast.

Glabrous except the inflorescence; culms slender, 3—14 in. high; leaves imbricate at the base, distant upwards, 4—1·8 in. long, 05—25 in. wide, margins scabrid; racemes 2—6 in. long; pedicels puberulous and with a fringe of stiff hairs on opposite sides; spikelets 07—09 in. long; glumes muricate, reddish-brown at maturity, lower as long as the spikelets, upper shorter; lemma 03—04 in. long, curved.

84. *Perotis*, Aiton

Tufted, wiry herbs, usually geniculate at the base. *Leaves* flat. *Racemes* spiciform, simple, terminal. *Spikelets* minute, subulate, 1-flowered, articulated on short or rudimentary pedicels, falling entire. *Glumes* subequal, narrow, tapering into a long, capillary awn. *Lemma* hyaline, much shorter than the glumes, its palea narrower, containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, shortly connate. *Grain* linear, terete, nearly as long as the glumes and free within them; embryo $\frac{1}{2}$ as long.

PEROTIS INDICA, O. Ktze. *P. latifolia*, Ait.; F. B. I. vii. 98; S. I. G. figs. 124, 125.

Common in all Districts; on sea-shore sands and elsewhere up to 5,000 ft.; usually in dry soils. Vern. *Tel.* Nakka peechu, Nakka toka; *Tam.* Narival, Kudrai-val pillu, Thopparai pillu; *Kan.* Nari misai hullu, Jabburu korlai hullu.

Culms 2—18 in. high; leaves closely imbricate below, rigid, pungently acute, 3—2·2 in. long, 15—4 in. wide, margins spinulose-ciliate; racemes slender, 1·2—7·5 in. long, feathery owing to the long awns; spikelets 06—08 in. long; glumes hispid; awns 3—65 in. long, usually purplish.

85. *Zoysia*, Willd.

Small, rigid herbs. *Leaves* very narrow, convolute, rigid. *Racemes* spiciform, solitary, simple, terminal; rhachis inarticulate, notched. *Spikelets* ovoid, laterally compressed, 1-flowered, articulated on very short, rather stout pedicels appressed to the rhachis. *Glume* single, coriaceous. *Lemma* smaller than and completely enclosed in the glume, hyaline; palea linear-oblong, containing a bisexual floret. *Lodicules* 0. *Stamens* 3. *Styles* 2, very long, connate below. *Grain* oblong, free within the lemma and glume.

ZOYSIA MATRELLA, Merr. *Z. pungens*, Willd.; F. B. I. vii. 99.

In sea-shore sand on both coasts.

Rootstock wiry, creeping, up to 3 ft. long; culms 1—10 in. high; leaves many, 5—2 in. long; racemes 3—1.4 in. long; glumes 1—1.4 in. long.

86. *Sporobolus*, R. Brown

Perennial, rarely annual, erect, prostrate or creeping herbs. *Leaves* narrow, flat or convolute. *Panicles* effuse or spiciform, often pyramidal. *Spikelets* small or minute, all alike, 1-, rarely 2-flowered, jointed on the pedicels or rarely on the rhachis; rhachilla very short, jointed at the base, not produced beyond the upper or the only lemma. *Glumes* membranous, mucous, nerveless or 1—3-nerved, unequal, the lower smaller, sometimes minute, persistent or falling singly. *Lemmas* mucous, ovate or oblong; paleas as long, sometimes emarginate, closely 2-nerved and often splitting between the nerves as the grain matures, enclosing a bisexual floret. *Lodicules* 2, very minute or 0. *Stamens* 2—3. *Styles* 2, free. *Grain* oblong, obovoid or pyriform, free within the lemma and palea; pericarp thin, hyaline, loose; embryo large.

Lower glume distinctly shorter than the lemma:—

Upper glume distinctly shorter than the lemma; leaves glabrous, flat, complicate or convolute mixed:—

Panicles effuse:—

Lemma .06 in. or more long:—

Lemma .06 in. long. Culms up to 30 in. high; leaves 4—12 in. long, .05—15 in. wide; panicles 4—18 in. long; lower glumes .01—0.2 in. long, upper .02—0.4 in. long.....1. *diander*.

Lemma .07—0.8 in. long. Culms up to 3 ft. high; leaves 3—24 in. long, .15—23 in. wide; panicles 6—18 in. long; lower glumes .02—0.3 in. long, upper .04—0.6 in. long.....2. *Walliehi*.

Lemma .04 in. or less long. Culms up to 15 in. high; leaves 5—11 in. long, .1—2 in. wide; panicles 12—20 in. long; lower glumes .01 in. or less long, upper .02 in. long.....3. *minutiflorus*.

Panicles spiciform or narrow, rarely slightly expanded:—

Leaves flaccid, usually flat, not pungent, up to 16 in. long, .1—2.2 in. wide. Not stoloniferous; culms up to 3 ft. high; rather robust; panicles 4—14 in. long, sometimes slightly expanded; lower glumes .02—0.3 in. long, upper .04—0.5 in. long; lemma .06—0.8 in. long.....4. *indicus*.

Leaves rigid, usually convolute, pungent. Stoloniferous:—

Panicles subspiciform, sometimes interrupted and flexuous, .3—4.5 in. long. Culms 7—17 in. high; leaves .33—2.5 in. long, .07—1.4 in. wide; spikelets shortly pedicelled; lower glume .04—0.5 in. long, lanceolate, acute, upper .06—0.8 in. long; lemma .06—1 in. long.....5. *tremulus*.

Panicles strictly spiciform, .7—2.5 in. long. Culms 3—9 in. high; leaves .7—2.7 in. long; spikelets sessile, crowded; lower glumes .02—0.3 in. long, quadrate, truncate, upper .05—0.6 in. long; lemma .07 in. long.....6. *spicatus*.

Upper glume as long as or longer than the lemma:—

Stoloniferous; leaves glabrous, margins minutely serrulate, convolute, rigid, pungent, .7—6 in. long. Culms 2.5—14 in. high; panicles spiciform or narrowly pyramidal, 1—4 in. long; lower glumes .03—0.4 in. long, upper .06—1 in. long; lemma .06—0.8 in. long.....7. *orientalis*.

Not stoloniferous; leaves pilose or bristly, rarely nearly glabrous.

Panicles contracted, subspiciform, 1—3 in. long. Culms tufted, 1—12 in. high; leaves flat or convolute, sparsely softly pilose, margins serrulate, sometimes ciliate from minute tubercles, .6—5.5 in. long, .05—1 in. wide; lower glumes .04—0.6 in. long, upper .06—0.8 in. long; lemma .07 in. long.....8. *piliferus*.

Panicles effuse; leaves flat, base rounded or subcordate, margins cartilaginous, serrulate and ciliate from tubercles:—

Panicles 1.5—5.2 in. long; rhachis and branches smooth. Culms tufted, spreading, 2—20 in. high; leaves glabrous or sparsely hairy from minute tubercles, .4—6.5 in. long, .15—22 in. wide; glumes glabrous, lower .01—0.2 in. long, upper .05—0.7 in. long; lemma .05—0.6 in. long.....9. *coromandelianus*.

Panicles 3—8 in. long, rhachis and branches scaberulous. Culms tufted, 4—20 in. high; leaves bristly from tubercles, 1.5—5 in. long, .18—4.5 in. wide; glumes more or less keeled, scaberulous on the back and keel, lower .04—0.5 in. long, upper .06—0.9 in. long; lemma .05—0.6 in. long.....10. *scabrifolius*.

Lower glume as long as or longer than the lemma. Culms decumbent below, erect portion 7—10 in. high; leaves convolute, rarely flat, rigid, pungent, margins smooth, .7—4 in. long, .1 in. wide; panicles narrow, 1—3 in. long; glumes and lemma subequal .08—1 in. long.....11. *virginicus*.

1. *SPOROBOLUS DIANDER*, Beauv.; F. B. I. vii. 247; S. I. G. fig. 178.
In all Districts except the W. Coast; up to 3,500 ft.
Readily eaten by cattle. Vern. *Kan. Navalu dondi hullu, Thoddu karai kandaka hullu*.
2. *SPOROBOLUS WALLICHII*, Munro ex Hook. f.; F. B. I. vii. 248.
In the central and eastern Districts from Cuddapah southwards; up to 3,000 ft.
3. *SPOROBOLUS MINUTIFLORUS*, Link; F. B. I. vii. 248.
S. Kanara and Chittoor Districts.
4. *SPOROBOLUS INDICUS*, R. Br.; F. B. I. vii. 247.
Kistna, Nilgiri, N. Coimbatore, Madura and Tinnevely Districts; sea-level to 7,000 ft.
A good pasture grass. Hardly distinguishable from some forms of *S. diander*, Beauv.; both may have 2 or 3 stamens.
5. *SPOROBOLUS TREMULUS*, Kunth.; F. B. I. vii. 250; S. I. G. figs. 179, 180.
In all Districts except the W. Coast and Ghâts; up to 2,500 ft.
Vern. *Tam. Uppurutnam pillu*.
6. *SPOROBOLUS SPICATUS*, Kunth; F. B. I. vii. 250.
Deccan, Coimbatore and Tinnevely Districts; up to 1,000 ft.
7. *SPOROBOLUS ORIENTALIS*, Kunth; F. B. I. vii. 251.
Godavari, Kistna, Guntur, Chingleput and Tinnevely Districts; usually in saline soils.
8. *SPOROBOLUS PILIFERUS*, Kunth; F. B. I. vii. 251.
W. Coast and Ghâts; up to 7,000 ft.
9. *SPOROBOLUS COROMANDELIANUS*, Kunth; F. B. I. vii. 252; S. I. G. figs. 181, 182. *S. commutatus*, Kunth; S. I. G. figs. 183, 184.

In all central and eastern Districts ; sea-level to 3,000 ft.

A poor fodder. Vern. *Kan.* Nari balada hennu hullu.

10. *SPOROBOLUS SCABRIFOLIUS*, Bhide ; S. I. G. figs. 185, 186.

Coimbatore and Tinnevely (Wight) Districts ; usually in black cotton soil.

11. *SPOROBOLUS VIRGINICUS*, Kunth ; F. B. I. vii. 249.

Coastal sands ; not very common.

87. *Myriostachya*, Hook. f.

Tall, stout, perennial marsh herbs ; rootstock thick, spongy. *Leaves* narrow, long, flat, equitant. *Panicles* narrow, elongate ; branches racemed, filiform ; pedicels jointed on the branchlets. *Spikelets* very many, strongly laterally compressed, distichously racemed, 4—20-flowered, not jointed on the pedicels ; rhachilla very stout, ultimately fragile at the base and between the slightly distant lemmas, not prolonged beyond the uppermost lemma. *Glumes* 2, coriaceous, persistent, subequal, lanceolate, tapering into a rigid awn, 1-nerved. *Lemmas* coriaceous, ovate-lanceolate, narrowed into a very short, stout, scabrid awn, 3-nerved, keel smooth ; paleas as long, chartaceous, acuminate, 2-toothed, 2-keeled, keels ciliate, containing each a bisexual floret. *Lodicules* 2, very minute. *Stamens* 3 ; anthers very small. *Styles* 2, free. *Grain* obliquely ovoid, subterete ; embryo large.

MYRIOSTACHYA WIGHTIANA, Hook. f. ; F. B. I. vii. 327.

Godavari District at Coringa.

Culms densely tufted, up to 10 ft. high ; rootstock sheathed, sometimes floating ; leaves several feet long, up to 65 in. wide ; panicles 1—2 ft. long ; spikelets 4—8-flowered ; glumes 17—21 in. long.

88. *Desmostachya*, Stapf

Perennial herbs, branched at the base ; branches covered with leathery sheaths at or just above the base. *Leaves* coarse, tufted. *Panicles* terminal, long, spiciform, often interrupted below ; axis stiff ; branches more or less spreading. *Spikelets* linear, strongly laterally compressed, often very many-flowered, sessile or subsessile, closely packed and more or less 2-ranked on the lower side of and often at right angles to the rhachis, straw-coloured or tinged with brown or purple, falling entire. *Glumes* 1-nerved, 1-keeled. *Lemmas* rigidly membranous, ovate, acute or subacute, mucous, 3-nerved, acutely 1-keeled ; paleas slightly shorter, 2-keeled, each containing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* obliquely ovoid, obtusely trigonous, loosely enclosed in the lemma and palea ; embryo about $\frac{1}{3}$ as long.

DESMOSTACHYA BIPINNATA, Stapf. *Eragrostis cynosuroides*, Beauv. ;

F. B. I. vii. 324 ; S. I. G. fig. 226.

Vizagapatam, Kistna, Nellore, Chingleput and Bellary Districts ; usually in sandy soil, often in wet places ; at low elevations.

Culms stout or slender, 7—36 in. high ; stolons stout, covered with shining sheaths ; leaves rigid, tips setaceous, 2—18 in. long, .05—3 in. wide ; panicles 2.5—13 in. long ; glumes .04—06 in. long ; lemmas .06—08 in. long.

89. *Leptochloa*, Beauv.

Annual, usually slender herbs. *Leaves* flat or involute. *Panicles* lax; branches slender, spiciform. *Spikelets* small, sessile or shortly pedicelled, 1—many-flowered, alternate and unilaterally 2-seriate, not jointed at the base; rhachilla jointed at the base, produced and jointed between the lemmas. *Glumes* membranous, oblong or lanceolate, 1-keeled, 1-nerved, the upper the longer. *Lemmas* ovate, obtuse or subacute, sometimes cuspidate, 1-keeled, 3-nerved, the lateral nerves close to the margins, often pubescent; paleas shorter, 2-keeled, each containing a bisexual floret or the terminal imperfect. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* subglobose, oblong-obovoid, compressed or trigonous, closely embraced by the lemma and palea, free or cohering to the latter.

Leaves lanceolate, flat, .9—3.5 in. long, .2—6 in. wide. Culms up to 42 in. high; panicles up to 13 in. long; racemes usually distant, 1—5 in. long; spikelets 1-flowered; glumes linear-lanceolate, acuminate or caudate, .09—1 in. long; grain fusiform, obtusely trigonous, rarely slightly compressed, grooved on one side, .05 in. long.....1. *uniflora*.

Leaves narrowly linear, flat or involute:—

Spikelets 1-flowered. Culms 12—30 in. high; leaves 3—7 in. long, .1—12 in. wide; panicles 6—13 in. long; racemes close, .6—2.3 in. long; glumes lanceolate, obtuse or apiculate, .05—0.6 in. long; grain ovoid, .03—0.4 in. long

2. *polystachya*.

Spikelets 2—7-flowered:—

Glumes lanceolate, acute, acuminate or caudate, .04—0.6 in. long; lemmas pubescent or hairy:—

Culms slender, 3—12 in. high; leaves flat, 1.5—5.4 in. long, .1—16 in. wide; panicles 2—5 in. long; racemes very slender, 1—2.5 in. long; florets usually 2, sometimes 3; grain subglobose, one side gibbous, the other convex, .025 in. long.....3. *filiformis*.

Culms comparatively stout, 1—4 ft. high; leaves flat or involute, 2.5—11 in. long, .1—2.5 in. wide; panicles 6—14 in. long; racemes 2—4.2 in. long; florets usually 3—6, sometimes 2 or 7; grain ellipsoid to oblong, biconvex or compressed.....4. *chinensis*.

Glumes ovate, rounded or retuse, .06—0.8 in. long. Culms up to 8 ft. high; leaves flat, 7—17 in. long, .1—2 in. wide; panicles 4—6 in. long; racemes 2—3.5 in. long; lemmas glabrous with the keel ciliolate; grain oblong or obovate-oblong, rounded, concavo-convex, .05 in. long.....5. *obtusiflora*.

1. *LEPTOCHLOA UNIFLORA*, Hochst.; F. B. I. vii. 297.

Chingleput, S. Coimbatore, S. Malabar, Madura and Tinnevely Districts; Travancore; sea-level to 4,000 ft.

2. *LEPTOCHLOA POLYSTACHYA*, Benth.; F. B. I. vii. 298.

In the eastern Districts from Godavari to Tinnevely; sometimes in marshes; up to 1,000 ft.

3. *LEPTOCHLOA FILIFORMIS*, Roem. et Sch.; F. B. I. vii. 298.

Vizagapatam, Godavari, Chingleput and Tanjore Districts.

4. *LEPTOCHLOA CHINENSIS*, Nees; F. B. I. vii. 299; S. I. G. fig. 212.

In most Districts; often in wet places; sea-level to 3,000 ft. A moderate fodder. Vern. *Tel.* Cheepura gaddi; *Kan.* Kadu sanna kari sajjai hullu.

Some forms of this species are hardly distinguishable from the previous one.

5. *LEPTOCHLOA OBTUSIFLORA*, Hochst.; F. B. I. vii. 299.

Nilgiri and Coimbatore Districts; Cochin State; 1,000—2,000 ft.

90. *Eragrostis*, Beauv.

Annual or perennial, usually erect and slender herbs. *Leaves* narrow, flat, complicate or convolute. *Inflorescence* of terminal open or contracted panicles, rarely of simple spikes. *Spikelets* small, many-, rarely 1—2-flowered, usually strongly laterally compressed, not articulated at the base; rhachilla continuous or articulate between the lemmas, not prolonged beyond the uppermost. *Glumes* 2, usually separately deciduous, broad, obtuse, acute or mucronate, never awned, back rounded, 1-keeled, 1-nerved or the upper sometimes 3-nerved. *Lemmas* imbricate, longer than the glumes which they resemble, sometimes acuminate or emarginate, 3-nerved, ultimately deciduous; paleas deciduous with their lemmas or persistent, broad, 2-keeled, keels smooth, scabrid or ciliate, each containing a bisexual floret or the uppermost and rarely the lowermost imperfect. *Lodicules* 2, very minute or 0. *Stamens* 1—3. *Styles* 2, free. *Grain* minute, globose, oblong-ovoid or obovoid, free within the lemma and palea.

Spikelets paniced:—

Rhachilla more or less jointed, breaking up from the apex downwards:—

Lemmas ciliate:— (1—21)

Lemmas acuminate, mucronate or cuspidate:—

Panicles clavate, dense, sometimes shortly interrupted at the base, rather shining, .8—4 in. long; glumes .06—1 in. long, obtuse; lemmas .1—11 in. long; keels of paleas narrowly winged, long-ciliate. Culms 4—30 in. high; leaves 1.2—5.5 in. long, .1—2.5 in. wide, usually flat.....1. *spicata*.

Panicles cylindric, compact, .8—3 in. long; glumes .04—0.6 in. long, acute; lemmas .08 in. long; keels of paleas not winged, long-ciliate. Culms 8—36 in. high; leaves 2.5—9 in. long, .1—3 in. wide.....2. *ciliata*.

Lemmas obtuse, .04—0.8 in. long; keels of paleas short to long-ciliate. Culms wiry, 4—30 in. high; leaves 1—5 in. long, .15 in. wide; panicles subspiciform, often lobed, dense or somewhat lax, 1.3—5 in. long

3. *coarctata*.

Lemmas not ciliate:—

Panicles spiciform:—

Annuals; culms slender, 5—10 in. high; leaves flat or convolute, usually ascending, 2—3.5 in. long, .1—1.5 in. wide; panicles 1.5—2.5 in. long; lemmas .06—0.8 in. long, their lateral nerves very close to the margins; paleas .05—0.6 in. long, ciliae of keels soft, distinctly longer than the width of the expanded palea.....4. *ciliaris*.

Perennials; culms wiry, 5—20 in. high, leaves often at right angles to the culm; panicles .5—2.2 in. long; lemmas .04—0.65 in. long, their lateral nerves near the middle of the sides; paleas .04—0.5 in. long, ciliae of keels stiff, shorter than the width of the expanded palea.....5. *riparia*.

Panicles more or less effuse:—

Panicles thyriform, 10—24 in. long; branches numerous, capillary, scaberulous, pedicels longer than the spikelets. Culms 8—26 in. high; leaves 8—18 in. long, .2—4 in. wide; glumes .04—0.5 in. long, obtuse; lemmas .06 in. long, obtuse or emarginate; grain subglobose, .02 in. long.....6. *aspera*.

Panicles oblong or linear, not thyriform:—

Grain ovoid, .015—0.2 in. long; stamens 3:—

Culms 2—18 in. high, more or less viscid below the panicle; leaves .7—4.5 in. long, .1—2 in. wide, usually convolute; panicles cylindric or oblong, 1—7 in. long; lower part of rhachis more or less viscid, branches and pedicels with minute glands, scented when fresh; glumes .03—0.5 in. long, obtuse; lemmas .04—0.5 in. long.....7. *viscosa*.

Culms 4—18 in. high, no part of plant viscid or glandular; leaves 3—7.5 in. long, .1—2.5 in. wide; panicles variable, linear, contracted

to oblong and effuse, 1·5—9 in. long; glumes ·03—·05 in. long, obtuse or subacute; lemmas ·04—·06 in. long, obtuse or acute

8. *plumosa*.

Grain obovoid, ·01 in. long; stamens 2; panicles narrow, more or less interrupted:—

Branches of panicles more or less whorled; spikelets 2—7-, sometimes up to 9-flowered. Culm 6—17 in. high; leaves flat or complicate, 4—10 in. long, ·12—2 in. wide; panicles 6—13 in. long; glumes ·016—·04 in. long; lemmas ·035—·05 in. long.....9. *japonica*.

Branches of panicles mostly solitary; spikelets 8—14-, seldom 6- or 7-flowered. Culms 12—24 in. high; leaves as in the previous species, up to 16 in. long, ·25 in. wide; panicles up to 24 in. long; glumes and lemmas as in the previous species.....10. *diarrhena*.

Rhachilla tough, persistent, lemmas falling off from the base upwards:—

Spikelets ovate or ovate-oblong, much compressed, ·16—·8 in. long, ·12—·18 in. wide, up to 80-flowered, pale or purple. Culms 5—25 in. high; leaves 1—7 in. long, ·1—·2 in. wide; panicles oblong or ovoid, ·8—10 in. long; branches usually spreading; glumes ·06—·1 in. long, acute; lemmas usually slightly shorter, broad, mucronate, their lateral nerves prominent; paleas not or very narrowly winged, falling with the lemmas; grain ellipsoid, or obovoid. ·025—·035 in. long.....11. *unioloides*.

Spikelets linear or linear-oblong, slightly compressed, lateral nerves of lemmas weak, or if spikelets flattened and lateral nerves prominent, then the paleas persistent:—

Spikelets more or less fascicled, close, pointing forwards:—

Leaves glaucous, 1·3—12 in. long, ·13 in. wide. Culms 5—56 in. high, often stout; panicles narrow, 2—12 in. long; lemmas ·06—·1 in. long; grain oblong or oblong-fusiform, ·03—·04 in. long.....12. *gangetica*. Leaves not glaucous, 2—5 in. long, ·05—·12 in. wide. Culms 3—36 in. high; panicles contracted or oval and more or less effuse, 3—10 in. long; lemmas ·05 in. long; grain globose or subglobose, ·016—·025 in. long.....13. *nutans*.

Spikelets scattered, spreading or pendulous:—

Upper glume 3-nerved, ·08 in. long, lower shorter. Culms 10—40 in. high; leaves 7—14 in. long, ·18—·32 in. wide, flat, margins usually glandular; panicle oblong, usually open, 4—13 in. long, lateral pedicels ·04—·12 in. long; spikelets linear-oblong, flattish, ·24—·75 in. long, ·08—·12 in. wide; lemmas 19—50, lateral nerves strong.....14. *cilianensis*.

Both glumes 1-nerved:—

Spikelets 4—1·5 in. long, ·08—·09 in. wide; glumes ·06—·08 in. long, acute; lemmas 10—70, ·07—·08 in. long. Culms 6—32 in. high; leaves 3·5—7·5 in. long, ·1 in. wide; panicles ovate, diffuse, 4—12 in. long

15. *tremula*.

Spikelets up to ·8 in. long; lemmas 6—15:—

Panicles rather stiff; lateral pedicels usually less than ·12 in. long:—

Glumes subequal or the upper only slightly the longer:

Leaves 1·5—7 in. long, ·08—·18 in. wide, margins often glandular, mouths of sheaths bearded. Culms 3—22 in. high, tufted; panicles oblong, open, 3—7 in. long; spikelets pale green to dark purplish or olive-grey, ·13—·3 in. long, ·08 in. wide; glumes ·04—·07 in. long; lemmas ·07—·08 in. long; grain globose or ellipsoid-globose ·025—·035 in. long.....16. *poaeoides*.

Leaves 1—7 in. long, ·1 in. wide, margins never glandular, mouths of sheaths naked. Culms 9—19 in. high; panicles oblong, 1·5—6 in. long; spikelets ·2 in. long, ·04—·05 in. wide; glumes ·04—·05 in. long; lemmas ·05 in. long; grain subglobose, ·025 in. long

17. *Rottleri*.

Lower glume ·02—·025 in. long, upper ·05 in. long. Culms very slender, 2—18 in. high; leaves rather rigid, ·4—4·8 in. long, ·04—·1 in. wide, margins sometimes glandular; panicles oblong, open, 1·5—3·5 in. long; spikelets ·3—·6 in. long, ·05 in. wide; lemmas ·06—·07 in. long; grain oblong, truncate at both ends, dorsally flattened and grooved, ·02—·03 in. long.....18. *Willdenoviana*.

Panicles lax, branches slender, flexuous or flaccid; lateral pedicels .12—.36 in. long; lateral nerves of lemmas faint:—

Leaves 2—13.5 in. long, .1—.12 in. wide, mouths of sheaths naked. Culms 4—.36 in. high; panicles oblong to lanceolate, 2—6.5 in. long, branches solitary or 2-nate; spikelets .3—.8 in. long, .06—.08 in. wide; glumes hyaline, lower .02—.025 in. long, obtuse, upper slightly longer, truncate; lemmas obtuse, .07—.08 in. long; grain oblong, dorsally grooved, .05—.06 in. long.....19. *tenuifolia*.

Mouth of sheaths bearded; grain .03—.04 in. long; branches of panicles often whorled:—

Spikelets .16—.3 in. long, .04 in. wide. Culms 2—24 in. high; leaves 2—9 in. long, .1—.12 in. wide; panicles oblong or pyramidal, open or contracted, 4—13 in. long; lower glume .025—.03 in. long, upper .05—.06 in. long; lemmas .08 in. long; grain ellipsoid, base laterally apiculate, .04 in. long.....20. *pilosa*. Spikelets .16—.24 in. long, .08 in. wide. Culms 7—30 in. high; leaves 3.5—17 in. long, .1—.22 in. wide; panicles effuse, 8—16 in. long; glumes .08—.1 in. long, upper slightly the longer; lemmas .1 in. long; grain subquadrate, .03 in. long.....21. *nigra*.

Spikelets secund on a simple spike with a slender rhachis alveolate and hispidulous on the side on which the spikelets are inserted; keels of paleas in all either winged or not:—

Leaves convolute or complicate, very slender, finely acuminate, puberulous above, 1—7.5 in. long. Culms 6—24 in. high; spikes 4—11 in. long; spikelets slightly to much compressed, linear to ovate-oblong, .25—.8 in. long, .08—.18 in. wide; glumes .07—.14 in. long, lower usually acuminate; lemmas 13—53, orbicular or broader than long, convex, keeled, obtuse or apiculate, keels of paleas often distinctly winged; grain broadly ellipsoid or subglobose, often obtusely trigonous, .025 in. long.....22. *bifaria*.

Leaves glabrous above; spikes 3—8.5 in. long; keels of paleas not or very narrowly winged:—

Leaves flat or complicate, rather rigid, apex rounded, .6—4 in. long, .08—.12 in. wide. Culms 4—18 in. high; spikelets nearly terete, .24—.75 in. long, .06—.1 in. wide; glumes .05—.06 in. long, obtuse or subacute; lemmas 9—42, very broadly ovate, obtuse, .08 in. long; grain subglobose-ovoid, .026 in. long.....23. *brachyphylla*.

Leaves convolute or complicate, 7—12.5 in. long, .08—.1 in. wide. Culms 10—15 in. high; spikelets ovate-lanceolate, much compressed, .28—.3 in. long, .1—.12 in. wide; glumes .06—.1 in. long, acute or acuminate; lemmas 12—30, .1—.11 in. long, obtuse or subacute; grain ellipsoid-oblong, .04 in. long.....24. *Walkeri*.

1. ERAGROSTIS SPICATA, Jedwabn. *E. phleoides*, Stapf; F. B. I. vii. 313.
Ganjam, Godavari and Salem Districts; Bangalore; up to 3,500 ft. Vern. Kan. Kadu nawanai hullu.
2. ERAGROSTIS CILIATA, Nees; F. B. I. vii. 313.
Ganjam, Vizagapatam, Rampa and Godavari Districts.
3. ERAGROSTIS COARCTATA, Stapf; F. B. I. vii. 313.
East Coast Districts; Mysore State; up to 2,000 ft.
4. ERAGROSTIS CILIARIS, Link; F. B. I. vii. 314.
Chittoor and S. Arcot Districts.
5. ERAGROSTIS RIPARIA, Nees. *E. tenella*, Roem., et Sch. var. *riparia*, Stapf; F. B. I. vii. 315.
In most Districts; sea-level to 3,000 ft.
A good fodder. Vern. Kan. Kadu kambu hullu.
6. ERAGROSTIS ASPERA, Nees; F. B. I. vii. 314.
Kurnool, Salem, Coimbatore, Nilgiri, S. Arcot, Trichinopoly and Madura Districts; sea-level to 2,000 ft.

7. *ERAGROSTIS VISCOSA*, Trin. *E. tenella*, Roem. et Sch. var. *viscosa*, Stapf; F. B. I. vii. 315.
In all Districts; sea-level to 2,500 ft.
Usually very sticky and scented. Said to be disliked by cattle.
Vern. *Tel.* Bankasigarantha.
8. *ERAGROSTIS PLUMOSA*, Link. *E. tenella*, Roem. et Sch. var. *plumosa*, Stapf; F. B. I. vii. 315.
In all Districts; sea-level to 4,000 ft.
A good fodder liked by horses and cattle. Makes good light hay.
Vern. *Tel.* Chinna garikai gaddi; *Kan.* Sanna purlai hullu.
9. *ERAGROSTIS JAPONICA*, Trin. *E. interrupta*, Beauv. var. *tenuissima*, Stapf; F. B. I. vii. 316.
Godavari, Nilgiri and Tinnevely Districts; Mysore and Travancore States, up to 3,000 ft.
10. *ERAGROSTIS DIARRHENA*, Steud. *E. interrupta*, Beauv. var. *diarrhena*, Stapf; F. B. I. vii. 316.
In the Northern and Eastern Districts; Travancore; up to 1,000 ft.
Var. *Koenigii*, C. E. C. Fischer n. comb. *E. interrupta*, Beauv. var. *Koenigii*, Stapf; F. B. I. vii. 316; S. I. G. fig. 217.
Panicles with short dense branchlets.
In most Districts; sea-level to 3,000 ft.
Readily eaten by cattle. The culms are used for making brooms.
Vern. *Tam.* Kanjara pullu; *Kan.* Kadu gasagasai hullu, Pini hullu.
11. *ERAGROSTIS UNIOLOIDES*, Nees. *E. amabilis*, W. et A.; F. B. I. vii. 317; S. I. G. fig. 218.
In all Districts; often in wet places; up to 7,000 ft.
The glumes are often purple or pink. Vern. *Tel.* Udara gaddi.
12. *ERAGROSTIS GANGETICA*, Steud. *E. elegantula*, Steud.; F. B. I. vii. 318.
In all Districts except on the W. Coast; up to 7,500 ft.
Readily eaten by cattle.
13. *ERAGROSTIS NUTANS*, Nees. *E. stenophylla*, Hochst.; F. B. I. vii. 318.
In all Districts; up to 2,000 ft.
Readily eaten by cattle in the absence of a better grass. Vern. *Ur.* Loocha bena; *Tel.* Nakurmaral, Urenkai, Pedda garikai.
14. *ERAGROSTIS CILIANENSIS*, Link. *E. major*, Host.; F. B. I. vii. 320; S. I. G. figs. 221, 222.
In all Districts except on the W. Coast; up to 4,000 ft.
Said to be liked by cattle. Vern. *Kan.* Bettada akabu hullu.
15. *ERAGROSTIS TREMULA*, Hochst.; F. B. I. vii. 320; S. I. G. figs. 219, 220.
Godavari, Kistna, Anantapur, S. Kanara and Tinnevely Districts.
Said to be a good fodder, but the foliage is too scanty to yield much substance. The slender pedicels allow the spikelets to stir with the slightest movement of the air and in that respect it resembles the European Quaker-grass. The seeds are sometimes eaten by the poor.
16. *ERAGROSTIS POAEOIDES*, Beauv. *E. minor*, Host.; F. B. I. vii. 321.
In the Northern, Central and Eastern Districts; up to 7,000 ft.
Vern. *Tel.* Goob-bai gaddi; *Kan.* Dodda purlai hullu.

17. *ERAGROSTIS ROTTLEI*, Stapf; F. B. I. vii. 321.
Tranquebar (Rottler).
18. *ERAGROSTIS WILLDENOVIANA*, Nees; F. B. I. vii. 322; S. I. G. figs. 223, 224.
In the Central and Eastern Districts from Kistna southwards.
Vern. Kan. Kari jontu hullu.
19. *ERAGROSTIS TENUIFOLIA*, Hochst.; F. B. I. vii. 322.
Mysore State; Bellary, N. Coimbatore, Salem, Madura and Tinnevely Districts; Nilgiri, Pulney and High Wavy Mountains; up to 7,000 ft. Vern. Kan. Thodda karakai hullu.
20. *ERAGROSTIS PILOSA*, Beauv.; F. B. I. vii. 323; S. I. G. fig. 225.
In all Districts except on the W. Coast; up to 7,000 ft.
In some localities said to be much liked by cattle, elsewhere reported to be rejected. Vern. Kan. Kadu sanna samai hullu.
21. *ERAGROSTIS NIGRA*, Nees; F. B. I. vii. 324.
N. Coimbatore, Nilgiri, Pulney and Tinnevely Hills; 2,000—7,000 ft.
22. *ERAGROSTIS BIFARIA*, Wight ex Steud.; F. B. I. vii. 325; S. I. G. fig. 227. *E. coromandeliana*, Trin.; F. B. I. vii. 326.
In all Districts; up to 4,000 ft.
Reported to yield good fodder. Vern. Tel. Gubbikal gaddi, Nooli gaddi, Wooda tallum; Kan. Kodi mara hullu, Nosai hullu.
23. *ERAGROSTIS BRACHYPHYLLA*, Stapf; F. B. I. vii. 327.
In the Central and Eastern Districts, from Vizagapatam to Coimbatore.
24. *ERAGROSTIS WALKERI*, Stapf.
Kurnool District on Cumbum Hill (Bourne).

91. *Halopyrum*, Stapf

Tall, stout, perennial herbs; rootstock creeping, branched, sheathed; roots vermiform. *Leaves* convolute, narrow, rigid. *Panicle* ovoid, elongate; branches alternate, spiciform, short; pedicels not jointed on the branchlets. *Spikelets* large, many-flowered, strongly laterally compressed, sessile or shortly pedicelled, not jointed on the pedicels; rhachilla very short between the lemmas, jointed at the base and between the lemmas, not produced beyond the uppermost one, silky hairy. *Glumes* coriaceous, subequal, ovate-lanceolate, acuminate or apiculate, lower 1—3-nerved, upper 5-nerved. *Lemmas* coriaceous, distichously imbricate, ovate-oblong, cymbiform, 3-nerved; paleas as long, subacute, 2-keeled, each enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong or ellipsoid, compressed, more or less deeply hollowed or concavo-convex, free within the lemma and palea; embryo large.

HALOPYRUM MUCRONATUM, Stapf; F. B. I. vii. 328.

Coast of Tinnevely District and on Krusadai Island.

Culms 5—24 in. high; leaves 4—12 in. long; panicles 6—16 in. long; spikelets 5—9 in. long, 10—17-flowered; glumes 3—35 in. long. Vern. Tam. Uppukarai pullu.

92. *Diplachne*, Beauv.

Tufted herbs. *Leaves* narrow, flat or convolute. *Panicles* lax, erect, simple or nearly so, branches slender, simple. *Spikelets* laterally compressed, sessile or subsessile, few- to many-flowered, not articulated at the base; rhachilla articulated between the lemmas, not prolonged beyond the terminal. *Glumes* membranous, the upper the longer, persistent, oblong-lanceolate, keeled, 1—3-nerved. *Lemmas* rather longer, thin, elliptic-oblong, tip 2—4-toothed 1—3-nerved, mucronate or awned, keeled; paleas oblong, 2-keeled, containing each a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* ovoid-oblong, subtrigonal, free within the lemma and palea.

DIPLACHNE FUSCA, Beauv.; F. B. I. vii. 329.

Kistna, Anantapur, Malabar and Tinnevely Districts; Travancore State; at low elevations.

Culms up to 5 ft. high; leaves 4—18 in. long, rarely flat; panicles 3·5—13 in. long; spikelets 4—13-flowered, 24—5 in. long; glumes ·08—11 in. long; lemmas 12—14 in. long, margins and margins of paleas hairy.

Buffaloes are said to eat it readily. Vern. *Tam. Mandi pillu*.

93. *Dichaetaria*, Nees ex Steud.

Slender perennial herbs. *Leaves* narrow, flat. *Panicles* of a few racemes on a long simple axis. *Spikelets* few, distant, 1-flowered, narrow, terete, pedicelled, not jointed at the base; rhachilla jointed at the base, produced beyond the lemma into a filiform arista bearing a minute empty glume below the middle. *Glumes* 2, equal or unequal, lanceolate, acuminate, 3-nerved, the upper subaristate, separately deciduous. *Lemma* much longer, very narrow, apex bifid with a long recurved awn from the sinus, 3-nerved; callus elongate, bearded; palea as long, finely acuminate, entire or minutely 2-toothed, 2-nerved, containing a bisexual floret. *Lodicules* 2, fleshy. *Stamens* 3. *Styles* 2, free. *Grain* very narrow.

DICHAETARIA WIGHTII, Nees ex Steud.; F. B. I. vii. 300.

Tranquebar (Rottler); rare.

Culms 1—2 ft. high; leaves nearly as long, 1—3 in. wide, mostly basal; panicles 8—18 in. long; racemes slender, up to 4 in. long; glumes 3—4 in. long; lemmas 6—7 in. long; awns 9—1 in. long.

94. *Oropetium*, Trin.

Dwarf, densely tufted, annual or perennial herbs. *Leaves* setaceous. *Spikes* solitary, terminal, slender, 2-ranked. *Spikelets* solitary, sessile, more or less sunk in the alternately distichous hollows in the rhachis, 1—4-flowered; rhachilla slender, disarticulating above the glumes and between the lemmas, when more than one. *Glumes* 2, subequal and persistent in the uppermost spikelet if more than one, otherwise the lower glume very small or 0; upper narrow, rigid, sometimes closing the hollow of the rhachis and concealing the florets. *Lemmas* hyaline, ovate to oblong, 1—3-nerved; paleas as long, 2-keeled, containing a

bisexual floret or, when more than one, the uppermost rudimentary. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong, terete, free within the lemma and palea.

OROPETIUM THOMAEUM, Trin.; F. B. I. vii. 366; S. I. G. fig. 228.

Rottboellia Thomaea, Koen.; Roxb. Cor. Pl. t. 132, lower fig.

In all the drier localities; sea-level to 4,000 ft.

Whole plant not exceeding 4 in. high, forming hard tussocks; leaves .25—1 in. long, often curved, more or less hairy; spikes .4—1.5 in. long; rhachis compressed, undulating; upper glumes .08—12 in. long; lemmas semicircular, .05 in. long.

95. *Microchloa*, R. Br.

Slender, usually perennial, tufted herbs. *Leaves* filiform, convolute, subsetaceous, pungent, the lower curved. *Spikes* solitary, terminal, very slender, often curved. *Spikelets* all alike, very small, 1-flowered, alternate and secund in two closely approximate rows, erect, not articulated at the base; rhachilla disarticulating above the glumes, not prolonged beyond the lemma. *Glumes* 2, subequal, subsistent, lanceolate-oblong, 1-nerved, keeled, cuspidate or acuminate. *Lemmas* much smaller, hyaline, oblong; palea nearly as long, 2-keeled, containing a bisexual floret. *Lodicules* 2, truncate. *Stamens* 3. *Styles* 2, free. *Grain* oblong, fusiform, free within the lemma and palea; embryo $\frac{1}{4}$ — $\frac{1}{2}$ as long.

MICROCHLOA INDICA, Beauv. *M. setacea*, R. Br.; F. B. I. vii. 283.

Rottboellia setacea, Roxb. Cor. Pl. t. 132, upper fig.

Godavari and Bellary Districts; Mysore State; Nilgiri and Pulney Hills; sea-level to 6,500 ft.; often growing on walls. Culms very slender, 1—18 in. high; leaves .4—3.5 in. long; spikes 1—7 in. long, purplish; rhachis rounded on the back, channelled in front, with the sessile spikelets inserted on either margin; glumes .1 in. long. Vern. *Tel.* Nagavamu gaddi; *Kan.* Navalu bannada hullu.

96. *Melanocenchris*, Nees

Small, tufted, annual or perennial herbs. *Leaves* rigid, flat or convolute. *Inflorescence* of sessile or shortly peduncled clusters of 4—5 spikelets secund on a flattened, terminal, solitary axis. *Spikelets* sessile, not articulated at the base, 2-flowered; rhachilla jointed at the base and between the lemmas, prolonged beyond the upper and sometimes bearing 1—2 empty scales (abortive lemma and palea of a third floret). *Glumes* 2, coriaceous, narrow, persistent, attenuated into a scabrous arista, the upper broader, with hyaline margins. *Lemmas* thinly membranous, cymbiform or broadly ovate, acute, entire and cuspidate or 3-cuspidate, keeled or nearly flat; paleas narrow, 2-cuspidate, 2-keeled, the lower containing a bisexual floret, the upper a ♂. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong, free within the lemma and palea.

Perennial; culms 6—17 in. high; leaves flat, linear or ensiform, mostly aggregated at the base, in elongated culms, narrower cauline ones also present, .7—4 in. long, .05—17 in. wide; rhachis 1.5—3.6 in. long; glumes (including aristas) .23—31 in. long, edges densely ciliate; rhachilla puberulous; lemmas .16—18 in. long, entire or minutely 2-toothed, cuspidate; paleas 2-toothed, back between the keels channelled; grain linear-oblong.....1. *monoica*.

Annual; culms 2—7 in. high; leaves convolute, very narrow, .4—1.7 in. long, not aggregated at base; rhachis .7—1.3 in. long; rhachilla glabrous; lemmas .18—21 in. long, shortly 3-aristate; paleas 2-cuspidate, back between the keels flat; grain elliptic, obtuse, compressed plano-convex; glumes as in *monoica*

2. *Royleana*.

1. *MELANOCENCHRIS MONOICA*, C. E. C. Fischer n. comb. non O. Ktz. *Gracilea mutans*, Koen.; F. B. I. vii. 283; S. I. G. fig. 187. In dry localities from the Kistna River to S. Arcot; Nilgiri District (Petrottet); up to 2,000 ft.

2. *MELANOCENCHRIS ROYLEANA*, Nees. *Gracilea Royleana*, Hook. f.; F. B. I. vii. 284; S. I. G. fig. 188.

Mysore State; Guntur, Bellary, Cuddapah, Chingleput and Kollegal Districts; up to 2,000 ft.

97. *Tripogon*, Roth.

Slender, often densely tufted herbs. *Leaves* mostly basal, very narrow, usually convolute. *Spikes* terminal, solitary, slender. *Spikelets* uniform, sessile, unilaterally 2-seriate, few-many-flowered, not articulated on the rhachis; rhachilla produced between the lemmas, not prolonged beyond the terminal, jointed at the base. *Glumes* membranous, 1-nerved; the lower usually lodged in a furrow of the rhachis, 1-toothed or -lobed on one side; the upper longer, entire or notched at the tip, mucronate or aristate, inserted distinctly higher on the rhachilla. *Lemmas* ovate, dorsally convex, 2-fid and awned from the sinus or 4-fid with the outer lobes awned, the inner lobes membranous and rarely awned, rarely truncate and mucicous, 3-nerved; paleas broad or narrow, complicate, usually truncate, keels ciliate, each containing a bisexual floret except the 1 or 2 terminal which are imperfect. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* very narrow, free within the lemma and palea.

Culms simple, slender, not thickened by the old sheaths; leaves not equitant, rigid or pungent:—

Lemmas 2-fid or entire:—

Lemmas 2-fid, awned or aristate from the sinus:—

Lemmas distinctly shorter than their awns:—

Awns finely capillary, flexuous, .8—1 in. long; lowest lemma .08—1 in. long, 2-fid, lobes acute; paleas not winged. Culms very slender, 1.5—7 in. high; leaves 1.5—10 in. long; spikes 6—14 in. long; spikelets remote, few-flowered; glumes cuspidate or aristate.....1. *capillatus*.

Awns geniculate or straight, not flexuous, .3—6 in. long:—

Lobes of lemma with aristas .16—22 in. long; lemmas puberulous, .11—14 in. long; awns geniculate, .42—6 in. long; paleas not winged. Culms slender, .5—3 in. high; leaves 1—2 in. long; spikes .3—2.5 in. long; spikelets well separated, few-flowered; glumes acuminate, upper .13—2 in. long.....2. *pauperculus*.

Lobes of lemma triangular, acute, lemma .2—25 in. long, awn not geniculate, curved, .3—36 in. long; paleas broadly winged. Culms 4—12 in. high; leaves 3—7.5 in. long; spikes 3—9 in. long; spikelets approximate, many-flowered, .5—1.5 in. long; glumes often 2-toothed and -mucronulate, upper .22—3 in. long.....3. *Wightii*.

Lemma longer than its arista, .13—16 in. long, lobes obtuse, arista .08—12 in. long; paleas narrowly winged. Culms 7—15 in. high; leaves 2—7.5 in. long; spikes 2—9 in. long; spikelets .3—9 in. long, many-flowered; glumes acute, upper .13—16 in. long.....4. *Jacquemontii*.

Lemmas rounded or truncate and minutely 3-toothed, .1 in. long, mucicous or with 1 short arista; paleas not winged. Culms 1—4 in. high; leaves .5—3 in. long; spikes 1—3.5 in. long; spikelets 1—2-flowered; glumes coriaceous, obtuse, upper .13 in. long.....5. *Roxburghianus*.

Lemmas 4-fid, .08—15 in. long, 2 inner lobes short, acute, with an arista from the sinus .08—13 in. long, 2 outer short, bearing aristas .07—1 in. long; paleas not winged. Culms 4—24 in. high; leaves 3—15 in. long, glabrous to densely hairy; spikes 2—11 in. long; spikelets usually close, several-flowered; glumes notched or 2-fid, upper .16—23 in. long.....6. *bromoides*.
 Culms branched, thickened below by the imbricate, old leaf-sheaths, slender and exserted above, 1—8 in. long; leaves .4—2 in. long, equitant, rigid, pungent, minutely hispidulous above; spikes 1.5—2.5 in. long; spikelets approximate, 7—9-flowered; glumes membranous, .12—16 in. long; lowest lemma .1 in. long, 2-fid, its arista .03—04 in. long; paleas not winged.....7. *pungens*.

1. *TRIOGON CAPILLATUS*, Jaub. et Spach.; F. B. I. vii. 285.
Mysore and Cochin States (Meebold); Wynaad (Beddome); 3,000—4,000 ft.; often epiphytic.
2. *TRIOGON PAUPERCULUS*, Stapf; F. B. I. vii. 285.
Bababudan Hills and Mysore State (Meebold); Travancore at Peermade (Venkoba Rao); 2,000—6,000 ft.
Growing on trees and rocks.
3. *TRIOGON WIGHTII*, Hook. f.; F. B. I. vii. 286.
Horsleykonda; Bellary District; Nilgiri Hills; Cochin and Travancore States; 1,000—6,000 ft.
4. *TRIOGON JACQUEMONTII*, Stapf.; F. B. I. vii. 286.
Nilgiri Hills; Coimbatore District; Travancore; up to 8,800 ft.
5. *TRIOGON ROXBURGHIANUS*, Bhide. *Lepturus Roxburghianus*, Steud.; F. B. I. vii. 365.
Guntur, Cuddapah, Anantapur and Bellary Districts.
In dry places among rocks.
6. *TRIOGON BROMOIDES*, Roth; F. B. I. vii. 287.
W. Ghâts; Mysore State; Bellary, Cuddapa and Vellore Districts; Travancore; 1,000—7,500 ft.
Often on rocks.
7. *TRIOGON PUNGENS*, C. E. C. Fischer in Kew Bull. 1934, 170.
S. Coimbatore District at Punachi in the Anamallais (Barber); Pulney Hills at Neutral Saddle (Bourne); 3,000—4,000 ft.

98. *Enteropogon*, Nees

Erect, sometimes tufted, perennial herbs. *Leaves* narrow, usually flat, the upper sometimes involute. *Spikes* slender, solitary or sometimes twin; rhachis flat or trigonous. *Spikelets* all alike, sessile, not jointed at the base, 1—3-flowered; rhachilla jointed at the base, continuous between the lemmas and prolonged beyond the uppermost. *Glumes* persistent, hyaline, acuminate, 1-nerved, keeled, the upper much the longer. *Lemmas* diminishing in length upwards, the lowest rather longer than the upper glume, chartaceous, 3-nerved, more or less keeled, entire or shortly 2-fid, awned from the sinus in continuation of the keel; paleas narrowly lanceolate, obtuse or 2-toothed, 2-keeled, keels scabrid, each containing a bisexual floret. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* narrow, free within the hardened lemma and palea.

ENTEROPOGON MONOSTACHYOS, K. Schum. *E. melicoides*, Nees; F. B. I. vii. 284; S. I. G. fig. 189.

In all Districts from Mysore State and Cuddapah southwards except on the W. Coast; sea-level to 2,000 ft.

Culms up to 3 ft. high, densely tufted; leaves 2·5–21 in. long, 1–2·5 in. wide; spikes 4–8 in. long; lower glume 0·9–1·4 in. long, upper 2·2–2·7 in. long; lowest lemma 2·7–3·1 in. long; awns 2·4–3 in. long. Vern. *Tam. Kannai pillu*.

99. *Cynodon*, Pers.

Perennial creeping grasses with erect culms. *Leaves* narrow, flat or complicate. *Inflorescence* of 2–8 fascicled or umbellate spikes; rhachis slender. *Spikelets* all alike, sessile, laterally compressed, alternately 2-seriate, imbricate, not jointed at the base, 1-flowered; rhachilla disarticulating at the base, rarely produced beyond the lemma. *Glumes* 2, thin, keeled, acute or mucronate, persistent or separately deciduous. *Lemmas* broader than the glumes, firmly membranous, boat-shaped, 3-nerved, keel ciliate, awnless; paleas 2-keeled, containing a bisexual floret. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong, free within the lemma and palea.

Lemmas longer than the upper glumes, broadly boat-shaped, 0·8–1 in. long:—

Erect culms 2–18 in. high; lower leaves usually flat, the upper often complicate, 4–4·7 in. long, 0·3–1·1 in. wide; spikes 3–7, 0·6–2·5 in. long, usually more or less erect; lower glume 0·5–0·8 in. long.....1. *Dactylon*.

Erect culms 7–40 in. high; leaves narrowly ensiform, flat, 1–4·5 in. long, 1·8–2·7 in. wide; spikes 3–6, usually spreading and curved, 2–4 in. long; lower glumes 0·4 in. long, upper 0·5–0·6 in. long.....var. *intermedius*.

Lemmas shorter than or equalling the upper glume, narrowly boat-shaped, 0·8 in. long, the ciliae on the keel often minutely knobbed. Erect culms 4–9 in. high; leaves flat, 0·6–2·5 in. long, 1–2 in. wide; spikes 3–5, 0·6–2·2 in. long; lower glume 0·4–0·8 in. long, upper 0·8–1 in. long.....2. *Barberi*.

1. *CYNODON DACTYLON*, Pers.; F. B. I. vii. 288; S. I. G. figs. 190, 191.

In all Districts except on the W. Coast; sea-level to 7,000 ft.

Underground stems often very long. Hariali grass.

A highly nutritious fodder, especially for horses. Vern. *Hind.*

Dub. Ur. Dubbula ghanso; *Tel.* Gericha gaddi, Gurka hariali;

Tam. Arugam pillu; *Kan.* Kudi garikai, Karkeri hullu.

Var. *intermedius*, C. E. C. Fischer n. comb. *C. intermedius*, Rang. et Tad.; S. I. G. figs. 192, 193.

Usually without underground stem.

In the same localities as the typical species but less common; up to 3,000 ft. The extreme forms are easily recognized, but the intermediate are not readily distinguishable.

2. *CYNODON BARBERI*, Rang. et Tad.; S. I. G. figs. 194, 195.

In the same region as the former species, but less common; not reported from Travancore.

100. *Chloris*, Sw.

Perennial, rarely annual, erect or decumbent herbs. *Leaves* usually flat, sometimes complicate or convolute. *Inflorescence* of solitary, umbelled or racemosely arranged spikes or spiciform racemes, erect or stellately spreading. *Spikelets* sessile or very shortly pedicelled, unilateral, 2-seriate, not jointed on the rhachis, with 1–4 perfect florets and 1–3 imperfect above; rhachilla articulated above the glumes, prolonged beyond the upper perfect floret and bearing 1–3 empty

lemmas above. *Glumes* 2, membranous, unequal, persistent, narrow, 1-nerved, keeled, mucronate or the upper more or less aristate. *Lemmas* 3-nerved, acute, obtuse or 2-fid, usually awned; paleas 2-nerved, 2-keeled, containing a bisexual floret. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* linear-oblong or ellipsoid, compressed or subtrigonal, free within the lemma and palea; often with a loose pericarp.

Spikes solitary, very rarely 2, .8—2.5 in. long, erect. Culms slender, 5—18 in. high; leaves 2—10 in. long; .1—1.5 in. wide; perfect florets 4, lowest lemma .2 in. long, broadly obovate, truncate with an arista .12—1.4 in. long, that of next longer, of the 4th very short or 0; empty lemmas 2, muticous.....1. *tenella*. Spikes 3—many; perfect florets 1—2:—

Spikes umbelled:—

Perfect floret 1:—

Empty lemma above the floret solitary, well-developed or rudimentary:—

Empty lemma represented by a fine arista .18—5 in. long hardly widened at the base. Culms procumbent or erect, 1—5 ft. high; peduncles long; leaves 2—22 in. long, .07—4 in. wide; spikes 3—10, 2—10.5 in. long; upper glumes .2—38 in. long; lemma oblong-lanceolate, glabrous, .17—28 in. long; awn .12—6 in. long.....2. *incompleta*.

Empty lemma oblanceolate, truncate, its arista .16—18 in. long. Culms decumbent, 3—18 in. high; leaves 1.5—7 in. long, .07—11 in. wide; spikes 4—7, .8—2.5 in. long; rhachis hairy; upper glumes .08—16 in. long; lemma obovate, acute, .1—1.2 in. long, apical margin long-ciliate; awn .15—26 in. long.....3. *virgata*.

Empty lemmas above the floret 2 or 3:—

Culms glabrous, 1—3 ft. high; leaves 2—12 in. long, .1—2 in. wide; spikes 4—20, 2—4 in. long, rhachis scaberulous; upper glumes .1—13 in. long; lemma .08—1 in. long, obovate, obtuse, back sparsely hairy, margins densely ciliate above the lower $\frac{1}{2}$, its arista .16 in. long; empty lemmas 2, lower obovate, upper subglobose, their aristas .12—18 in. long...4. *barbata*.

Culms puberulous or hairy for at least a short distance below the spikes:—
Culms 3—30 in. high, hairy for a short distance below the spikes; leaves 1—10 in. long; .02—1 in. wide, glabrous; spikes 3—13, .6—2.8 in. long, rhachis glabrous; upper glumes .08—13 in. long; lemma obovate to oblanceolate, keel glabrous, back sparingly hairy at the sides, margins long-ciliate, .08—1 in. long; awn .16—3.4 in. long; empty lemmas 2—3, lower obovate, truncate, upper subglobose, their aristas .1—3 in. long

5. *montana*.

Culms 3—8 in. long, usually puberulous throughout, sometimes hairy above; leaves .7—1.5 in. long, .05—1 in. wide, densely short-hairy; spikes 3—4, .5—1 in. long, rhachis densely hairy; upper glumes .08—1 in. long; lemma obovate, obtuse, emarginate or 2-toothed, back asperulous, keels and margins long-ciliate, .1 in. long; awn .2—3 in. long; empty lemmas 3, obovate, apiculate, puberulous, their awns .2—3 in. long

6. *Wightiana*.

Perfect florets 2. Culms 1—3 ft. high, minutely puberulous just below the spikes; leaves 1—10 in. long, .05—2 in. wide, glabrous; spikes 3—9, 1.4—4 in. long; upper glume .07—1 in. long; lowest lemma obovate, back scaberulous, keel and margins long-ciliate, .09—16 in. long, awn .16—23 in. long; second lemma broader, shorter with a shorter awn; empty lemmas 2, subglobose, their aristas .08—18 in. long.....7. *Bournei*.

Spikes racemously arranged, 14—30, 1.5—2.5 in. long. Culms 18—30 in. high; leaves 2—6.5 in. long, .1—1.5 in. wide; upper glume .06 in. long; perfect lemma solitary, .06—0.9 in. long, narrowly lanceolate, acute, 2-toothed, sparsely ciliate on the keel and margins above the middle, its awn .33—4.4 in. long; empty lemmas 2, minute, their awns .25—4 in. long.....8. *polystachya*.

1. CHLORIS TENELLA, Roxb.; F. B. I. vii. 290; S. I. G. fig. 197.

Bellary District.

Reputed a good fodder.

2. *CHLORIS INCOMPLETA*, Roth ; F. B. I. vii. 290 ; S. I. G. fig. 196.
In all Districts except on the W. Coast ; often in hedges and scrambling among bushes ; sea-level to 2,500 ft.
Eaten by cattle before flowering. Vern. *Tel.* Kanthari gaddi ; *Kan.* Melamalai hullu.
3. *CHLORIS VIRGATA*, Sw. ; F. B. I. vii. 291 ; S. I. G. fig. 198.
Bellary and Salem Districts ; Mysore State ; 2,000—3,000 ft. Vern. *Tel.* Uppu gaddi.
4. *CHLORIS BARBATA*, Sw. ; F. B. I. vii. 292 ; S. I. G. figs. 199, 200, 201.
In all Districts except on the W. Coast ; sea-level to 2,000 ft.
A good fodder before flowering. Vern. *Tam.* Kodai pillu, Sevarugu pullu ; *Kan.* Hennu manchada kalu hullu.
5. *CHLORIS MONTANA*, Roxb. ; F. B. I. vii. 292 ; S. I. G. figs. 204, 205.
In the central and eastern Districts and southwards to Cape Comorin ; sea-level to 2,000 ft. Vern. *Kan.* Kondai javara hullu
6. *CHLORIS WIGHTIANA*, Nees ; F. B. I. vii. 293.
S. India, without precise locality (Wight).
7. *CHLORIS BOURNEI*, Rang. et Tad. ; S. I. G. figs. 202, 203.
Godavari, Bellary, S. Arcot, Coimbatore and Tanjore Districts ; up to 2,500 ft.
8. *CHLORIS POLYSTACHYA*, Roxb. ; F. B. I. vii. 292.
Bellary District ; Nilgiri, Coimbatore, Pulney and Tinnevely Hills ; Cape Comorin ; up to 2,500 ft.

101. Eleusine, Gaertner

Annual or perennial herbs. *Leaves* flat or complicate. *Inflorescence* of capitate, digitate, whorled or scattered spikes. *Spikelets* small, sessile, 2—3-seriate, secund, imbricate, pointing forwards at an acute angle to the rhachis, with a terminal spikelet or sometimes only an abortive lemma ; laterally compressed, not jointed to the rhachis ; rhachilla continuous between the 2—12 lemmas. *Glumes* persistent, subequal, keeled, acute or cuspidate ; lower 1-nerved ; upper often broader, 1—7-nerved. *Lemmas* resembling the glumes ; the lowest usually the longest, 3-nerved ; paleas complicate, strongly 2-keeled, each containing a bisexual floret or the terminal a ♂ or empty. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* small, free within the lemma and palea ; pericarp loose, hyaline.

Erect ; leaves 3 in. or more long ; spikes umbelled or scattered ; lemmas and paleas glabrous :—

Spikes in one whorl, occasionally 1—2 solitary spikes below the umbel ; glumes entire :—

Rhachis of spike slender, glabrous. Culms not very stout, 6—30 in. high ; leaves 3—20 in. long, .1—2.5 in. wide ; spikes 2—9, .9—5.5 in. long ; lowest lemma .12—1.4 in. long ; paleas not winged ; grain oblong, narrowed at the ends, laterally compressed.....1. *indica*.
Rhachis broad, margins scabrid. Culms usually stout, 1—3 ft. high ; leaves 10—24 in. long, .2—5 in. wide ; spikes 4—many, 1—4 in. long ; lowest lemma .15—1.7 in. long ; paleas winged on the keels ; grain globose.....2. *coracana*.
Spikes 4—30 in 1—several whorls with scattered solitary or twin spikes intermixed, 1.5—5 in. long ; rhachis slender. Culms 1—4 ft. high ; leaves 3—10 in. long, .1—5 in. wide ; glumes usually with notched tips ; lowest lemma .11—1.4 in. long, truncate or 2-toothed caudate ; paleas with ciliolate, wingless keels ; grain oblong-subglobose, grooved down one side, rugose and muriculate

3. *verticillata*.

Prostrate or creeping, spreading and rooting from the nodes; culms 1—9 in. high; leaves .5—1.2 in. long, .05—1.5 in. wide; spikes numerous, crowded into a globose head, .3—5 in. across; lowest lemma .15—.17 in. long, cuspidate, densely hairy on the keel and on the 2 lateral nerves below the middle; paleas densely hairy on the keels; grain ovate to nearly orbicular, concavo-convex, transversely rugose

4. *lagopoides*.

1. *ELEUSINE INDICA*, Gaertn.; F. B. I. vii. 293, S. I. G. fig. 206.
In all Districts; up to 6,500 ft.
A fair fodder. Vern. *Tam.* Thippa ragi.
2. *ELEUSINE CORACANA*, Gaertn.; F. B. I. vii. 299.
Cultivated in the dry and hilly parts of most Districts; up to 5,000 ft. Believed to be the cultivated form of the previous species.
The grain is an important article of food for the poorer classes.
The culms and leaves are a good cattle-fodder. Vern. *Ur.* Mandiya; *Tel.* Ragi, Ragulu, Thamidalu, Chodalu; *Tam.* Ragi, Kalvaragu, Kapai; *Kan.* Ragi.
3. *ELEUSINE VERTICILLATA*, Roxb.; F. B. I. vii. 295.
In all the eastern Districts; Mysore State; Nilgiri and Coimbatore Districts; up to 3,000 ft.
A good fodder. Vern. *Tam.* Kadu kapai.
4. *ELEUSINE LAGOPOIDES*, Mett.; *E. brevifolia*, R. Br.; F. B. I. vii. 294; S. I. G. fig. 207.
Along the E. coast and inland as far as Coimbatore; usually in sandy tracts and salt soils; up to 1,500 ft.

102. *Dactyloctenium*, Willd.

Annual or perennial, usually erect herbs. *Leaves* flat. *Spikes* in one terminal umbel, rarely reduced to a solitary spike. *Spikelets* sessile, laterally compressed, densely imbricate in 2 rows, usually at right angles to the rhachis, which is produced in a rigid point beyond them; rhachilla disarticulating above the lower glume, continuous between the lemmas. *Glumes* deciduous, slightly unequal, 1-keeled, 1-nerved; lower ovate to oblong, acute or obtuse, persistent; upper oblong, obtuse, mucronate or cuspidate. *Lemmas* 3—5, firmly membranous, ovate, 1-keeled, 3-nerved, acuminate, mucronate or cuspidate; paleas 2-keeled, each containing a bisexual floret or the uppermost more or less imperfect. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grains* oblong to globose; pericarp loose.

DACTYLOCTENIUM AEGYPTIUM, Beauv. *Eleusine aegyptiaca*, Desf.; F. B. I. vii. 295; S. I. G. figs. 5, 208, 209.

In all Districts; up to 3,000 ft.

Erect or creeping in poor soils; culms 1.5—30 in. high; leaves 1—10 in. long, .08—.35 in. wide, glabrous or more or less pilose; spikes 1—7, digitately radiating, .3—1.5 in. long; lemmas broad, subfalcate, strongly cuspidate, lowest .12—.14 in. long.

103. *Dinebra*, Jacq.

Annual herbs; culms leafy. *Leaves* flat. *Inflorescence* of slender, spreading or deflexed spikes collected in narrow, pyramidal racemes, sometimes paniced. *Spikelets* crowded, secund, 2-seriate, sessile, 2—3 flowered, not jointed at the base; rhachilla slender, jointed at the base, produced beyond the uppermost floret and bearing an imperfect lemma.

Glumes 2, persistent, subequal or the upper longer, lanceolate, 1-nerved, 1-keeled, awned or cuspidate. *Lemmas* much shorter, hyaline, broadly ovate, subacute or obtuse, 1-nerved; *paleas* as long, hyaline, 2-keeled. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong or ovoid, trigonous, free within the lemma and palea; embryo $\frac{1}{2}$ as long.

DINEBRA RETROFLEXA, Panz. *D. arabica*, Jacq.; F. B. I. vii. 297; S. I. G. figs. 17, 210, 211.

In the central and eastern Districts from Godavary to Coimbatore; up to 3,000 ft.

Culms 2—36 in. high; *leaves* 2—10 in. long, $\frac{1}{2}$ —3 in. wide; *inflorescence* 3—16 in. long; *spikes* $\frac{3}{4}$ —2 $\frac{1}{2}$ in. long; *glumes* rigid, $\frac{1}{8}$ — $\frac{1}{4}$ in. long; *lemmas* $\frac{1}{8}$ — $\frac{1}{4}$ in. long; *grains* $\frac{1}{5}$ in. long, acute. Readily eaten by cattle before flowering. Vern. Tel. Wadata toka gaddi; Kan. Nari balada gandu hullu.

104. *Enneapogon*, Desv.

Perennial herbs. *Leaves* narrow, flat or convolute. *Panicles* contracted or spiciform. *Spikelets* distichous, 1—3-flowered, not jointed on the pedicels; *rhachilla* disarticulating at the base. *Glumes* 2, persistent, keeled, 3—9-nerved. *Lemmas* 4—5, shorter, broad, concave, 9-nerved, 9-awned; *awns* subulate, equal or alternately shorter and longer, plumose, ciliate or scaberulous; *paleas* oblong, 2-toothed, 2-keeled, the lowest containing a bisexual floret, the rest gradually shorter and with a ♂ floret or empty, the uppermost rudimentary or reduced to a tuft of hairs. *Lodicules* 2, minute, fleshy. *Stamens* 3. *Styles* 2, free. *Grain* ovoid or oblong, free.

ENNEAPOGON ELEGANS, Stapf. *Pappophorum elegans*, Nees; F.B.I. vii. 301; S. I. G. figs. 215, 216.

In all central and eastern Districts from Kurnool southwards; Coimbatore and Nilgiri Districts; up to 3,000 ft.

Culms slender, wiry, 2—20 in. high, erect from a woody, often thickened base; *leaves* flat or convolute $\frac{1}{2}$ — $\frac{3}{4}$ in. long, $\frac{1}{5}$ — $\frac{1}{4}$ in. wide; *panicles* 2—3 $\frac{1}{2}$ in. long; *glumes* $\frac{1}{6}$ — $\frac{1}{4}$ in. long; lowest lemma $\frac{1}{8}$ in. long, its awns $\frac{1}{3}$ — $\frac{1}{4}$ in. long, the uppermost minute, usually reduced to 3 short aristas.

105. *Pommereulla*, Linn. f.

Perennial creeping herbs; rootstock stoloniferous. *Leaves* linear, flat or complicate; basal sheaths equitant. *Spike* terminal, simple or forked; *rhachis* flattened. *Spikelets* distant or close, sessile, 2—3-flowered; *rhachilla* articulated at the base, very short, continuous between the lemmas, shortly produced beyond the uppermost floret, with or without a rudimentary lemma. *Glumes* membranous, persistent, amplexicaul at the base; the lower 1-nerved; the upper broader and longer, 3-nerved. *Lemmas* 5—6, spirally arranged to form an inverted cone; the lowest with a pungent callus; the 2 lowest epaleate and empty, flabelliform, embracing the upper, 4-lobed, lobes acute, acuminate, mucronate, cuspidate or shortly aristate, the 2 inner narrow, the 2 outer broad, the lemma bearing a slender awn on the middle of the back; the upper lemmas gradually smaller, similar but concave at the base,

3-lobed with the middle lobe entire or 2-cuspidate, the third and fourth or third to fifth lemmas paleate; paleas ovate, flat, 2-keeled with wide flaps, containing each a bisexual floret; the uppermost lemma epaleate and empty. *Lodicules* 2. *Stamens* 2—3. *Styles* 2, free. *Grain* oblong, biconvex or plano-convex, loose within the lemma and palea; pericarp loose; embryo orbicular, small.

POMMEREULLA CORNUCOPIAE, Linn. f.; F. B. I. vii. 300; Roxb. Cor. Pl. t. 131; S. I. G. figs. 213, 214.

Vizagapatam (Narayanswami), Kistna (Barber) and Chingleput Districts.

Stolons several inches long; culms solitary or tufted, 1·5—12 in. high; leaves ·5—4 in. long, ·05—·15 in. wide, apex rounded; spikes partly enclosed in the upper spathiform leaf-sheath or long exerted, ·8—3 in. long; glumes ·3—·5 in. long; callus ·08—·1 in. long, villous; lowest lemma ·25—·33 in. long, silkily villous on the nerves, its awn ·2—·3 in. long; grain ·06 in. long.

106. *Elytrophorus*, Beauv.

Erect, annual herbs. *Leaves* very narrow, flat. *Inflorescence* of densely-packed globose clusters of spikelets continuous in a cylindric mass, lobed or interrupted, on a simple terminal axis. *Spikelets* very small, laterally compressed, sessile, not articulated at the base, 3—6-flowered, subtended by many empty glumes; rhachilla very short, smooth, jointed at the base and between the lemmas. *Glumes* 2, subequal, persistent, membranous, lanceolate, mucronate or aristate, 1-keeled, 1-nerved. *Lemmas* 3—7, rather larger, ovate, aristate, 3-nerved; paleas complicate, truncately 3-lobed, 2-keeled, one or both keels winged, the uppermost empty, the rest containing each a bisexual floret. *Lodicules* 2. *Stamens* 1—3; anthers minute. *Styles* 2, free. *Grain* minute, narrowly oblong or fusiform, compressed; pericarp loose at both ends.

ELYTROPHORUS SPICATUS, A. Camus. *E. articulatus*, Beauv.; F. B. I. vii. 306.

Ganjam, Chingleput, Arcot, Tanjore and Malabar Districts; Mysore State; sea-level to 3,000 ft.

Culms ·05—12 in. high; leaves 1—12 in. long, ·05—·2 in. wide; inflorescence 1·5—9 in. long; glumes and lemmas ·06—·08 in. long, their aristas ·05—·09 in. long. Vern. *Tam.* Vayal tenai; *Kan.* Nela antabu hullu.

107. *Aeluropus*, Trin.

Low, much-branched, rigid, perennial, leafy herbs. *Leaves* distichous, coriaceous, usually convolute, pungent. *Inflorescence* of terminal crowded heads. *Spikelets* minute, sessile, laterally compressed, 6—many-flowered, not articulate at the base; rhachilla obscurely articulate at the base and between the lemmas, not produced beyond them. *Glumes* membranous, persistent, rounded on the back, apiculate, mucronate or cuspidate; lower 1—3-nerved; upper much larger, 5—7-nerved. *Lemmas* membranous, longer than the glumes, 7—9-nerved; paleas as large, broadly cuneate, 3-lobed, lobes erose, 2-keeled, flaps broad, keels nearly

smooth or ciliate, each enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* oblong or obovoid, free within the lemma and palea.

AELUROPUS LAGOPOIDES, Trin. ex Thw. *A. villosus*, Trin.; F. B. I. vii. 334.

Coastal sands and alkaline soils on both coasts; often in marshy places.

Roots long, wiry; culms tufted, 1—14 in. high; leaves sometimes flat, .15—2 in. long, up to .15 in. wide; heads oblong or globose, .3—8 in. long; glumes and lemmas more or less villous, the former .06—08 in. long, the latter .1—11 in. long.

108. *Oryza*, Linn.

Tall, annual or perennial herbs. *Leaves* narrow, flat or convolute. *Inflorescence* spicate or paniced. *Spikelets* strongly laterally compressed, 1-flowered, appearing to be articulated on a short dilated pedicel but actually articulated above 2 abortive glumes. *Glumes* above the articulation 2, minute, subulate or absent. *Lemma* chartaceous or coriaceous, the size and shape of the spikelet, often strongly nerved or ribbed, obtuse, acute or awned, its palea as long, similar, containing a bisexual floret. *Lodicules* 2, entire or 2-lobed. *Stamens* 6. *Styles* 2, free. *Grain* narrowly oblong, free within the lemma and palea.

Lemma, excluding its awn, .35 in. or less long, punctate or granulate, not winged on the back:—

Panicles compound, 2.5—12 in. long, spikelets numerous; glumes oblong, .12—14 in. long, often much shorter in cultivated plants; lemma .25—3 in. long, regularly punctate, hispidulous, with a slender barbellate awn 1.4—5 in. long in wild plants, awnless in cultivated ones. Culms up to 4 ft. high; leaves 4—22 in. long, .1—35 in. wide.....1. *sativa*.

Panicles simple, 1.5—4 in. long, spikelets few; lower glume 0 or minute, upper .04—06 in. long; lemma .22—24 in. long, densely irregularly granulate, glabrous. Culms rather slender, up to 3 ft. high; leaves 3—10.5 in. long, .3—9 in. wide.

2. *Meyeriana*.
Lemmas .45—.5 in. long, excluding a stiff, glabrous arista .13—.17 in. long, keel broadly winged above the middle, smooth, glabrous. Culms up to 6 ft. high; leaves 6—20 in. long, .25—.5 in. wide; sheaths tessellate; panicles spiciform, 4—8 in. long; glumes finely subulate, .16—.21 in. long.....3. *coarctata*.

1. *ORYZA SATIVA*, Linn.; F. B. I. vii. 92.

In all Districts; in marshes; sea-level to 2,000 ft. Much cultivated in all Districts in wet fields for its edible grain and its straw. The Paddy or Rice plant.

There are numerous races of the cultivated form. Vern. *Hind*. Dhan; *Ur*. Dhanho; *Tel*. Vadlu; *Tam*. and *Mal*. Nelli; *Kan*. Batta.

2. *ORYZA MEYERIANA*, Baill. *O. granulata*, Nees et Arn.; F. B. I. vii. 93. In most Districts; up to 4,000 ft.

3. *ORYZA COARCTATA*, Roxb.; F. B. I. vii. 93.

Godavari District at Tallurevu (Barber).

109. *Leersia*, Sw.

Slender, perennial herbs. *Leaves* narrow, flat. *Panicle* contracted, usually flaccid. *Spikelets* imbricate, laterally compressed, 1-flowered.

Glumes 0 or reduced to an obscure, hyaline, entire or 2-lobed rim. *Lemmas* coriaceous or chartaceous, oblong, strongly 1-keeled; *palea* similar in texture and shape, nearly as long but narrower, 1-keeled, containing a bisexual floret. *Lodicules* 2. *Stamens* usually 6, sometimes 3 or fewer. *Styles* 2, free. *Grain* oblong, compressed, free within the lemma and palea.

LEERSIA HEXANDRA, Sw.; F. B. I. vii. 94; S. I. G. fig. 119.

In all Districts; in marshes and lakes; sea-level to 7,000 ft. Culms up to 4 ft. high; leaves usually stiff, 3–8 in. long, 1–4 in. wide; panicles 2–5 in. long; lemma obliquely oblong, 13–15 in. long, keels of lemma and palea bristle-ciliate.

Much liked by cattle. Vern. *Hind.* Jungli dhan; *Mal.* Nir valli pullu; *Kan.* Kadu bili sajjabu hullu.

110. Hygrorhiza, Nees.

Glabrous floating herbs; culms spongy below, emitting capillary roots at the nodes. *Panicles* short, broad. *Spikelets* narrowly lanceolate, 1-flowered, articulate on their pedicels but tardily deciduous. *Glumes* 0. *Lemmas* thinly chartaceous, narrowed into an awn; *palea* similar but narrower, awnless, containing a bisexual floret. *Lodicules* 2, gibbous. *Stamens* 6; anthers long, slender. *Styles* 2, free. *Grain* narrowly oblong, free within the lemma and palea.

HYGRORHIZA ARISTATA, Nees; F. B. I. vii. 95; S. I. G. fig. 120.

Along both coasts; Mysore State at Kumsi (Meebold) at 2,000 ft. Floating culms a foot or more long, erect branches 2–8 in. high; leaves subcoriaceous, ovate to narrowly ovate-oblong, base subcordate, 1–3.1 in. long, 2–7 in. wide; panicles 1–2 in. long; spikelets few, long-pedicelled; lemma narrowly lanceolate, 23–3 in. long, strongly 5-nerved; awn 25–55 in. long, scabrid.

The grain is eaten by the poor. Readily eaten by cattle. Vern. *Tam.* Valli pullu.

111. Anthoxanthum, Linn.

Perennial, erect, usually sweet-scented herbs. *Leaves* flat. *Panicles* spiciform or more or less branched and somewhat lax. *Spikelets* pedicelled, slightly laterally compressed, 3-flowered; rachilla disarticulating above the glumes. *Glumes* 2, persistent, membranous, sometimes chaffy and shining, complicate, sharply keeled; the upper the longer and with a strong rib on each side close to the keel. *Lemmas* 3; the 2 lower similar and subequal, laterally compressed, 1-keeled, hairy, 2-lobed or 3-lobed, sometimes the upper to near the base, the lowest bearing an arista from $\frac{1}{3}$ – $\frac{1}{2}$ way below the tip, usually slightly overtopping it, but sometimes shorter, the second with a geniculate awn from the back; the uppermost lemma shorter, usually complicate and 1-keeled, glabrous. *Paleas* of the 2 lower lemmas, if present, narrow, 2-keeled, empty or containing a ♂, usually 3-stamened floret; the uppermost palea complicate, 1-keeled, enclosing a bisexual floret, usually with 2 stamens. *Lodicules* 0. *Styles* 2. *Grain* elliptic-ovoid, slightly laterally compressed; embryo $\frac{1}{4}$ as long.

ANTHOXANTHUM HOOKERI, Rendle. *Hierochloa Hookeri*, C. B. Clarke ex Hook. f.; F. B. I. vii. 223.

Pulney Hills in the vicinity of Kodaikanal; 6,000—7,000 ft. Possibly an escape from gardens, but I have seen no specimen from a garden.

Rootstock creeping; culms 20—40 in. high; leaves 4—11 in. long, 2—4 in. wide, closely ribbed as are also the sheaths; panicles lax; upper glume 23—27 in. long; 2 lower lemmas 18—22 in. long, brown-hairy; awn 28—4 in. long; uppermost lemma 1—12 in. long, rarely emarginate with a short arista.

Anthoxanthum odoratum, Linn.; F. B. I. vii. 222. The sweet vernal grass is cultivated in gardens in the hills. It differs from the above species through its smaller size; leaves mostly basal; panicles spiciform, short and close; 2 lower lemmas 12—15 in. long, devoid of paleas and empty; uppermost lemma 06—08 in. long.

112. *Lophatherum*, Brogn.

Perennial, leafy herbs. *Leaves* petioled, flat, narrowly lanceolate, tessellate with transverse nerves. *Panicles* subsimple, lax, narrow; branches alternate. *Spikelets* solitary, secund, narrowly lanceolate, terete, 1-flowered, jointed at the base; rhachilla not jointed, produced beyond the floret and bearing several closely-sheathing, cuspidate, empty lemmas. *Glumes* 2, membranous, the upper the longer, rounded on the back or the lower 1-keeled, 5—7-nerved, acute or obtuse, margins often hyaline. Lowest lemma longer, 7—9-nerved, mucronate or cuspidate; palea narrow, 2-keeled, keels narrowly winged, containing a bisexual floret. *Lodicules* 2—3. *Stamens* 3. *Styles* 2, connate at the base. *Grain* oblong and compressed or fusiform and terete, free within the lemma and palea; embryo long.

LOPHATHERUM GRACILE, Brogn.; F. B. I. vii. 331.

Travancore without specific locality (Venkoba Rao).

Culms 2—5 ft. high; leaves 4—10 in. long, 1—1.5 in. wide; panicles 6—18 in. long, branches few; spikelets 33—5 in. long, terminated by the erect or spreading cusps of the empty lemmas.

113. *Centotheca*, Desv.

Perennial, leafy herbs. *Leaves* rather broad, with transverse veins. *Panicles* subsimple, lax; branches long, slender, spiciform; pedicels capillary. *Spikelets* secund, alternate, laterally compressed, all perfect or the 1—several upper empty, perfect ones 1—3-flowered, not articulated at the base; rhachilla very slender, articulated at the base and between the lemmas, rarely produced above the uppermost. *Glumes* 2, persistent unequal, distant at the insertions, ovate-oblong, 3- or 5-nerved. *Lemmas* ovate to oblong, obtuse or acute, rounded on the back, 5- or 7-nerved, the upper ones usually bearing soft, erect, ultimately deflexed, tubercle-based bristles; paleas narrow, 2-keeled, keels ciliolate, containing each a bisexual floret. *Lodicules* 0. *Stamens* 2—3, *Styles* 2, free. *Grain* ovoid, acute, terete, free within the lemma and palea.

CENTOTHECA LAPPACEA, Desv. ; F. B. I. vii. 332.

In most Districts, more abundant in wet localities ; up to 3,000 ft. Culms stout, 1—5 ft. high ; leaves narrowly lanceolate to ovate, 2—10 in. long, .45—1.4 in. wide ; panicles 3.5—14 in. long ; glumes .09—14 in. long, the upper the longer ; lowest lemma .16—.2 in. long.

114. *Melica*, Linn.

Perennial, erect herbs. *Leaves* narrow, flat or convolute. *Panicles* open, spiciform or reduced almost to a raceme, often secund. *Spikelets* few to many, laterally compressed or subterete, 1—5-flowered, jointed on the pedicels or not ; rhachilla disarticulating tardily at the base, readily between the flowering lemmas. *Glumes* 2, membranous, scarious or hyaline, persistent or falling separately, equal or unequal, 3- or 5-nerved or the upper 7-nerved. *Lemmas* firmly membranous, the margins and tips often hyaline, 5—9-nerved ; paleas 2-keeled, the lower 1—3, rarely 4—5, containing each a bisexual floret, the several above smaller, empty, embracing each other to form a clavate or oblong terminal body. *Lodicules* 2, connate. *Stamens* 3. *Styles* 2, free. *Grain* oblong or subcylindric, terete or semi-terete ; embryo small.

MELICA SCABERRIMA, Hook. f. ; F. B. I. vii. 330.

Introduced and escaped from gardens around Ootacamund (Gamble) ; 7,000 ft.

Culms 1—3 ft. high ; leaves 2—3.5 in. long, .1—1.5 in. wide ; panicles often effuse and large ; perfect florets usually 2 or 3, sometimes up to 5 ; glumes ovate-lanceolate or the upper elongate-lanceolate, lower .18—.2 in. long, 1-nerved, upper .21—.25 in. long, 3-nerved ; lemmas .21—.28 in. long, minutely scaberulous.

115. *Briza*, Linn.

Annual or perennial, erect herbs. *Leaves* flat or convolute. *Panicles* effuse, sometimes reduced to a raceme ; branches and pedicels capillary. *Spikelets* pendulous, laterally compressed, few-many-flowered ; rhachilla disarticulating above the glumes and between the lemmas. *Glumes* 2, scarious or firmly membranous, boat-shaped and keeled or saccate and rounded on the back, persistent, subequal, 3—9-nerved. *Lemmas* firmly membranous with scarious margins, shaped more or less like the glumes, obtuse, acute or subaristate, 7—9-nerved, the outer 3 or all the lateral nerves palmately spreading ; paleas much shorter, broad, 2 keeled, keels often winged, each containing a bisexual floret or the upper reduced. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* ovoid, concavo- or plano-convex, usually dorsally compressed ; embryo small.

Spikelets ovate, few, sometimes only 1 or 2, .4—9 in. long, straw-coloured to brown or purplish, 7—20 flowered. Culms 5—26 in. high ; leaves 2—8 in. long, .2—3 in. wide ; glumes very broadly ovate, .2—3 in. long ; lemmas very broadly ovate-cordate, .3 in. long, the upper at least silky-hairy.....1. *maxima*. *Spikelets* numerous, triangular to ovate, often wider than long, .12—15 in. long, green, rarely purplish, 4—9-flowered. Culms 2—15 in. high ; leaves 1.5—5 in. long, .12—.32 in. wide ; panicles broadly obovate, lax, 1.5—3.5 in. long ; glumes .08—.1 in. long, horizontally spreading ; lemmas broadly ovate-cordate, very gibbous below, the scarious margins very broad, .08—.1 in. long, glabrous

2. *minor*.

1. BRIZA MAXIMA, Linn.; F. B. I. vii. 336.

Introduced and run wild about the Nilgiri and Pulney Hill Stations and in Travancore; 7,000—8,000 ft. The Large Quaker- or Quaking-grass.

2. BRIZA MINOR, Linn.; F. B. I. vii. 336.

Introduced and run wild around Ootacamund and Kodaikanal; 6,000—7,000 ft. The Small Quaker- or Quaking-grass.

116. Poa, Linn.

Annual or perennial, usually small herbs. *Leaves* flat or convolute. *Panicles* lax or contracted, rarely spiciform. *Spikelets* laterally compressed, 2—6-flowered, not jointed at the base; rhachilla jointed at the base and between the lemmas. *Glumes* 2, thinly membranous, subequal, acute or obtuse, 1-keeled, 1—3-nerved. *Lemmas* membranous, acute or obtuse, 5—7-nerved; paleas shorter, 2-keeled, each containing a bisexual floret or the uppermost reduced. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* ovoid, oblong or linear, often grooved, free within the lemma and palea or adhering to the latter; embryo small.

Lemmas connected by long, often copious silky wool; .12—16 in. long; rhachilla long-silky-woolly. Culms 1—2 ft. high; leaves 2.5—8 in. long, very narrow, panicles 2—2.5 in. long; glumes acute, lower .08—11 in. long, upper .1—15 in. long.

1. *trivialis*.

Lemmas not connected by wool, .12 in. long; rhachilla glabrous. Culms tufted, 2—12 in. high; leaves 1—4.5 in. long, .1—12 in. wide; panicles 1—2.5 in. long; glumes obtuse, lower .06 in. long, upper .08 in. long.....2. *annua*.

1. POA TRIVIALIS, Linn.

Introduced and escaped around Ootacamund and in the Pulney Hills; 5,000—7,000 ft. The Rough Meadow-grass.

2. POA ANNUA, Linn.; F. B. I. vii. 345.

Probably introduced and escaped around the Hill Stations of the Nilgiri and Pulney Hills; 4,000—7,200 ft. The Annual Meadow-grass.

117. Glyceria, R. Brown

Perennial, rarely annual herbs. *Leaves* flat or convolute. *Panicles* effuse or contracted. *Spikelets* laterally compressed, few- to many-flowered, not jointed at the base; rhachilla jointed between the lemmas. *Glumes* 2, thin, unequal, persistent, 1—5-nerved. *Lemmas* membranous with a broadly hyaline tip, broadly oblong, obovate or fan-shaped, rounded or truncate, rarely subacute, back rounded, 3—9-nerved; paleas 2-keeled, all but the empty uppermost enclosing a bisexual floret. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* terete or compressed, free between the lemma and palea or sub-adherent to the latter.

GLYCERIA FLUITANS, R. Br.; F. B. I. vii. 347.

Introduced and escaped about Ootacamund; 7,000—7,500 ft.; usually in wet situations. The Floating Meadow-grass.

Culms 1—3 ft. high, lax; leaves flaccid, 2.5—11 in. long, .15—35 in. wide; panicles narrow, 4—12 in. long, branches rather distant; perfect florets 7—12; glumes broadly oblong, lower .08—09 in. long, upper .13—14 in. long; lemmas broadly oblong, the lowest .18—22 in. long; paleas 2-toothed, keels narrowly winged upwards.

118. *Dactylis*, Linn.

Stiff, erect, perennial herbs. *Leaves* flat. *Panicles* terminal, unilateral, composed of short, crowded, unilateral spikes. *Spikelets* subdistichous, compressed, not jointed at the base, 3—10-flowered; rhachillas continuous. *Glumes* scarious, persistent, unequal, lanceolate, acuminate, mucronate or caudate; lower 1-nerved; upper 3-nerved. *Lemmas* rather longer, rigid, subaristate, keel scabrid, 5-nerved; paleas 2-fid, 2-keeled, keels ciliolate, each enclosing a bisexual floret, or the uppermost reduced or empty. *Lodicules* 2, fleshy, 2-lobed. *Stamens* 3. *Styles* 2, free. *Grain* oblong, acute, trigonous, dorsally subcompressed, ventrally channelled.

DACTYLIS GLOMERATA, Linn.; F. B. I. vii. 335.

Introduced and run wild in and about Ootacamund; 7,000—8,000 ft. The Cock's-foot grass.

Culms 1—3 ft. high, erect from a short, creeping rootstock; leaves 3—18 in. long, 1—3 in. wide; panicles 1·5—5 in. long; lower glume 1·5—2 in. long, upper 2·5 in. long; lemmas 3—4, lowest 2·6—3 in. long.

119. *Vulpia*, Gmelin

Annual, slender, erect herbs. *Leaves* very narrow, involute or convolute. *Panicles* contracted, narrow, usually more or less secund; pedicels clavate. *Spikelets* laterally compressed after flowering, 1—7-flowered; rhachilla slender, disarticulating at the base and between the fertile lemmas. *Glumes* very unequal; the lower minute or obsolete or like the upper subulate to subulate-lanceolate but much shorter, 1-nerved; the upper usually 3-nerved. *Lemmas* subulate-lanceolate, tapering into a straight awn, back rounded, faintly 5-nerved; paleas entire or minutely 2-toothed, 2-keeled, 1—several lower containing each a bisexual floret, the 1 or 2 uppermost reduced. *Lodicules* 2, hyaline. *Stamens* 1—3. *Styles* 2, free. *Grain* linear, back strongly compressed, concave in front, enclosed within the lemma and palea, adhering to the latter or to both; embryo small.

VULPIA MYUROS, Gmel. *Festuca Myuros*, Linn.; F. B. I. vii. 356.

Introduced and escaped about Ootacamund and Kodaikanal; 6,500—8,000 ft. The Mouse-tail fescue-grass.

Culms 6—18 in. high; leaves setaceous, at least when dry, 1—10 in. long; panicles narrow, spiciform, erect or nodding, 2—10 in. long; lower glume 0·2—0·7 in. long, upper 1·6—2 in. long, acuminate; lemmas 3—5 perfect, 1—2 reduced, lowest 2·3—3·4 in. long, its awn 4·6—7 in. long.

120. *Festuca*, Linn.

Perennial, tufted herbs. *Leaves* flat, folded or convolute, often setaceous; sheaths more or less open, seldom closed. *Panicles* more or less compound, contracted or open, sometimes effuse. *Spikelets* laterally compressed (at least after flowering), 2—many-flowered; rhachilla disarticulating at the base and between the lemmas. *Glumes* subequal,

rarely conspicuously unequal, more or less keeled, 1—3-nerved, the upper rarely 5-nerved. *Lemmas* lanceolate, muticous, mucronate or awned from the tip or very near it, back rounded or keeled towards the apex, 5—7-nerved; paleas more or less 2-toothed, 2-keeled, containing each a bisexual floret, the uppermost usually reduced. *Lodicules* 2, hyaline. *Stamens* 3. *Styles* 2, free. *Grain* oblong, back convex, grooved or concave in front, tightly enclosed in the slightly hardened lemma and palea, free or more or less adhering to the palea or to both; embryo small.

FESTUCA OVINA, Linn.

Introduced and escaped about Ootacamund; 7,000—8,000 ft.

Sheep's fescue-grass.

Culms wiry, 6—15 in. high; leaves convolute and more or less setaceous, 1·3—3 in. long (much longer in the viviparous form); panicles open, 1—3 in. long; glumes 1—18 in. long, the upper about $\frac{1}{2}$ longer than the lower; lemmas lanceolate, 22—25 in. long, 4—7 with perfect florets.

121. Bromus, Linn.

Annual or perennial herbs. *Leaves* narrow, flat. *Panicles* contracted and often dense or open and sometimes effuse or reduced to a raceme. *Spikelets* laterally compressed (at least after flowering), rather large, erect or pendulous, not jointed at the base, usually many-flowered; rachilla disarticulating at the base and between the lemmas. *Glumes* usually unequal, persistent, acute to acuminate; the lower 1—7-nerved; the upper 3—9-nerved. *Lemmas* lanceolate to broadly oblong, back rounded or keeled, 5—13-nerved, usually awned, sometimes 3-awned, median or only awn erect or recurved, sometimes twisted at the base, not kneeled; paleas entire or 2-fid, keels 2, scabrid or ciliate, enclosing each a bisexual floret, the uppermost reduced. *Lodicules* 2. *Stamens* 3, rarely 2. *Ovary* obovoid with a villous 2- or 3-lobed appendage. *Styles* 2, lateral on the appendage. *Grain* linear to linear-oblong, usually concavo-convex, enclosed in and usually adhering to the lemma and palea or at least to the latter; embryo small.

Perennial; culms up to 6 ft. high; leaves 4—18 in. long, 12—5 in. wide, glabrous or more or less hairy; panicles up to 1 ft. long; lower glume 1-nerved, 12—34 in. long, upper 3-nerved, 18—43 in. long; lemmas 3—9, 28—5 in. long, 5—7-nerved, aristate, scaberulous, keeled below the tip.....1. *asper*. Annual; culms up to 28 in. high; leaves 5—15 in. long, 1—3 in. wide, glabrous; panicles narrow, usually nodding, 3—16 in. long; spikelets strongly compressed; glumes keeled, lower 5—7-nerved, 44—58 in. long, upper 7—9-nerved, 49—7 in. long; lemmas 4—10, 5—7 in. long, 9—13-nerved, cuspidate, keeled...2. *catharticus*.

1. **BROMUS ASPER, Murray; F. B. I. vii. 358.**

Nilgiri and Pulney Hills; 5,500—8,000 ft.

Doubtfully indigenous.

2. **BROMUS CATHARTICUS, Vahl. B. unioides, H. B. K.; F. B. I. vii. 357.**
Nilgiri Hills; 6,500—8,000 ft.

An introduced American grass escaped about Ootacamund and Kotagiri; sometimes grown for fodder.

Flowers cleistogamous.

122. *Streptogyna*, Beauv.

Tall, erect, perennial herbs. *Leaves* petioled, flat, with obscure transverse venules. *Spikes* erect, unilateral. *Spikelets* long, narrow, subterete, imbricate, 1—6-flowered, not jointed at the base; rhachilla very long, slender, articulated at the base and between the lemmas. *Glumes* chartaceous, persistent; the lower oblong, tip truncate and erose, 3—7-nerved to the tip; the upper much longer, acuminate, tip entire or 2-toothed, awned. *Lemmas* chartaceous, very narrow, convolute, tip acutely 2-fid and awned from the sinus, 3-nerved; paleas as long, keels 2, close, smooth, each enclosing a bisexual floret. *Lodicules* 3, elongate. *Stamens* 2—3. *Style* single, long, twisted, with 2—3 long, tortuous stigmas. *Grain* linear, free but closely embraced by the lemma and palea.

STREPTOGYNA GERONTOGEA, Hook. f. *S. crinata*, Thw. non Beauv.; F. B. I. vii. 333.

S. Travancore; in moist forest.

Culms 2—6 ft. high; leaves 6—12 in. long, 4—1 in. wide; spikes 4—16 in. long; lower glumes 3—14 in. long, upper $2\frac{1}{2}$ —3 times longer; lowest lemma a little longer than the upper glume, its awn 6—1 in. long.

123. *Brachypodium*, Beauv.

Annual or perennial herbs. *Leaves* flat or setaceously convolute. *Racemes* terminal, simple, spiciform; joints of axis more or less hollowed, at least the lower, opposite the spikelets. *Spikelets* often few, rarely solitary, at first cylindric, later laterally compressed, erect and appressed to the rhachis or spreading, 5-many-flowered; rhachilla disarticulating above the glumes and between the lemmas. *Glumes* 2, persistent, firm, more or less unequal, 3—7-nerved. *Lemmas* oblong to oblong-lanceolate, usually narrowed into a mucro or a straight arista, back rounded, 7—9-nerved, at first imbricate, then spreading; paleas rather broad, obtuse or truncate, 2 keeled, keels rigidly ciliate, each enclosing a bisexual floret, the uppermost more or less reduced. *Lodicules* 2, ciliate. *Stamens* 2 or 3. *Ovary* crowned with a villous appendage. *Styles* 2, lateral. *Grain* linear or linear-oblong, concavo-convex, enclosed in the lemma and palea, more or less adherent to the latter; embryo small.

BRACHYPODIUM SYLVATICUM, Beauv.; F. B. I. vii. 362.

About the hill-stations in the Nilgiris and around Kodaikanal; 5,000—7,000 ft. Probably introduced and escaped.

Culms up to 4 ft. high; leaves 3—8 in. long, 1—3 in. wide, flat and flaccid or convolute; racemes 2—8 in. long; lower glume 16—18 in. long, 3-nerved, upper 26—27 in. long, 5—7-nerved; lemmas 8—14, 29—36 in. long, 7—9-nerved, mucro or arista 4—32 in. long.

124. *Lolium*, Linn.

Annual or perennial, erect herbs. *Leaves* flat or convolute. *Spikes* terminal, simple, solitary; rhachis alternately and distichously hollowed opposite the spikelets. *Spikelets* solitary, 2-ranked, usually more or less

compressed, the lowest lemma appressed to the rhachis, 3—11-, sometimes more-flowered. *Glumes* 2 in the terminal spikelet, equal and similar, in all the other spikelets the lower glume suppressed; upper linear to oblong, persistent, rigid, many-nerved. *Lemmas* shorter, oblong, obtuse, acute or awned, back rounded, 5-many-nerved; paleas as long, 2-keeled, keels sometimes narrowly winged, each containing a bisexual floret or the uppermost reduced. *Lodicules* 2. *Stamens* 3. *Styles* 2, free. *Grain* elliptic- to linear-oblong, tightly enclosed by and adhering to the lemma and palea; embryo short.

LOLIUM PERENNE, Linn.; F. B. I. vii. 365.

Introduced and escaped around Ootacamund and in the Pulney Hills. The Rye grass.

Perennial; culms up to 18 in. high; leaves 3—12 in. long, .05—.15 in. wide, flat or convolute; spikes 3—9 in. long; glumes .34—.4 in. long; lemmas 3—11, .24—.28 in. long.

125. *Triticum*, Linn.

Annual or biennial herbs. *Leaves* flat. *Spikes* terminal, solitary; rhachis excavated opposite the spikelets, articulate or inarticulate. *Spikelets* solitary, distichous, tumid, few-flowered. *Glumes* 2, persistent, rigid, often unequal-sided, obtuse or shortly awned. *Lemmas* oblong or ventricose, back rounded or keeled upwards, muticous or 1—3-awned, 5—9-nerved; paleas as long, 2-keeled, keels ciliate, the lower each containing a bisexual floret, the upper enclosing a ♂ floret or empty. *Lodicules* 2. *Stamens* 3. *Styles* 2. *Grain* oblong, ventrally grooved, often hairy, free within the lemma and palea or adhering to the latter.

TRITICUM DICOCCUM, Schrank. *T. vulgare*, Vill.; F. B. I. vii. 367.

Cultivated here and there for its grain, but not extensively. The Wheat or Corn plant. Vern. *Tel* Godumalu; *Tam*. Godumai; *Mal*. Kotampam; *Kan*. Godi.

126. *Hordeum*, Linn.

Annual or perennial herbs. *Leaves* flat. *Spikes* terminal, solitary, simple, cylindric; rhachis excavate or jointed. *Spikelets* 2—3-nate in the hollows or at the nodes of the rhachis, 1-flowered or the lateral imperfect; rhachilla jointed below the lemma and produced above it as a bristle, sometimes bearing an abortive lemma. *Glumes* 2, persistent, rigid, narrow, the outer ones of each cluster together often resembling an involucre. *Lemmas* lanceolate, tapering into a long straight or recurved awn, back rounded, 5-nerved; paleas about as long, 2-keeled, deeply folded between the keels, containing a bisexual float, or in the lateral spikelets a ♂ floret or empty and much reduced. *Lodicules* 2. *Stamens* 3. *Styles* 2. *Grain* ovoid- or narrow-oblong, grooved in front, tip usually villous, tightly enclosed in the lemma and palea and adhering to the latter or to both; embryo small.

HORDEUM HEXASTICHON, Linn. *H. vulgare*, Linn. var. *hexastichon*, Aitchis.; F. B. I. vii. 371.

Occasionally cultivated in the hills. The Barley plant. Vern. *Tam*. Ganji, *Dorai* ganji.

127. *Arundinaria*, Michaux

Erect or climbing woody shrubs. *Culms* slender; nodes usually prominent. *Culm-sheaths* thin, papery, straw-coloured; imperfect blades narrow, subulate. *Leaves* usually small. *Inflorescence* various, paniculate or racemose. *Spikelets* often long, compressed, often enclosed in bracteate sheaths, 1-many-flowered. *Glumes* 2, membranous, unequal. *Lemmas* longer, concave, many-nerved, obtuse, acute or mucronate; paleas usually shorter, prominently 2-keeled, usually compressed, all containing a bisexual floret, except sometimes the reduced terminal. *Lodicules* 3, ovate or lanceolate, ciliate. *Stamens* 3, rarely up to 6, usually exserted, anthers usually blunt. *Ovary* globular above, often hairy. *Style* short; stigmas 2—3. *Grain* ovate or narrowly oblong, smooth, furrowed on the back, enclosed in the persistent lemma and palea.

Large shrubs; culm-leaves over 4 in. long, distinctly, shortly petioled; spikelets many in large terminal panicles 3—5-flowered:—

Leaves thick with thickened cartilaginous margins, base nearly truncate, 5—11 in. long, 1—1·7 in. wide.....1. *Walkeriana*.
Leaves thin, margins neither thickened nor conspicuously cartilaginous, base usually shortly narrowed, 4—7 in. long, 7—1 in. wide.....2. *Wightiana*.
Small shrubs up to 3 ft. high; leaves densely imbricate, thick, rigid, pungent, margins thickened, cartilaginous, sessile or nearly so, 8—1·5 in. long, 17—3 in. wide; spikelets in racemes on leafy branches, 1-flowered.....3. *densifolia*.

1. *ARUNDINARIA WALKERIANA*, Munro; F. B. I. vii. 377; Gamble Ann. Calc. vii. t. 1.

Pulney Hills (Beddome).

2. *ARUNDINARIA WIGHTIANA*, Nees; F. B. I. vii. 377; Gamble Ann. Calc. vii. t. 2.

Nilgiri, Palghat, Pulney and High Wavy Mountains (Blatter and Hallberg); 3,000—8,000 ft.

Common underwood in the Nilgiri Sholas. Flowering annually; densely gregarious.

- Var. *hispida*, Gamble; F. B. I. vii. 377.

Leaf-sheaths and stems thickly covered with golden hairs from tubercles; internodes more flattened on one side.

Nilgiri Hills; 7,000—7,500 ft.

3. *ARUNDINARIA DENSIFOLIA*, Munro; F. B. I. vii. 379; Gamble Ann. Calc. vii. t. 7.

Anaimudi in Travancore at 8,500 ft. (Beddome).

Densely gregarious.

128. *Dendrocalamus*, Nees

Trees, sometimes large, always unarmed. *Culms* usually erect from a densely branched rootstock, sometimes nearly solid. *Culm-sheaths* often very large, usually elongate, variously auricled; imperfect blades narrowly triangular. *Leaves* sometimes very broad, without transverse veins but frequently with pellucid glands instead. *Panicles* large, compound; the spikelets usually in globose congested heads in long spikes. *Spikelets* ovate, florets few, rarely more than 6, usually bisexual. *Glumes* 2—3, ovate, acute or mucronate, many-nerved. *Lemmas* similar; paleas ovate, acute, truncate, emarginate or 2-cleft, the lower 2-keeled and ciliate,

the uppermost usually rounded on the back and eciliate. *Lodicules* usually 0. *Stamens* 6; filaments free; anthers mucronate or with tufted hairs. *Ovary* ovoid or subglobose, often depressed, hairy above. *Style* long, usually hairy; stigma usually simple. *Grain* small; pericarp crustaceous or hardened.

DENDROCALAMUS STRICTUS, Nees; F. B. I. vii. 404; Bedd. Fl. Sylv. t. 325; Brand. For. Fl. t. 70. Gamble Ann. Calc. vii. tt. 68, 69. *Bambos stricta*, Roxb. Cor. Pl. t. 80.

Gregarious in all the drier hill-tracts; 300—4,800 ft.; absent from the W. Coast. The Male Bamboo.

Variable in size according to climate; culms 20—50 ft. high, 1—3 in. diam., sometimes solid; leaves in very dry localities 1—2 in. long, in moist ones up to 10 in. long, 2—1·2 in. wide; spikelets in dense globose heads 3—1·3 in. diam., spinescent, usually hairy, the fertile intermixed with smaller barren ones; lemmas ending in a short, sharp spine surrounded by ciliate tufts of hairs.

The culms are much used for poles, rafters, lance-shafts, lathies, matting, baskets, etc. Vern. *Hind.* Bans; *Ur.* Salia bhanso, Salimbo bhanso; *Tel.* Sadanapa veduru, Pen veduru, Kanka; *Tam.* and *Mal.* Kal mungil.

129. *Bambusa*, Schreber

Shrubs or trees, rarely climbing, often very large, sometimes thorny. *Culms* from a thick rhizome, sometimes stoloniferous. *Culm-sheaths* usually broad, as also the triangular imperfect blades. *Leaves* small to moderately large, their sheaths variously auriculate. *Inflorescence* usually a large, leafless, compound panicle with the spikelets in heads on spicate branchlets, but sometimes in leafy panicles or paniculate spikes. *Spikelets* 1—many-flowered. *Glumes* 1—3. *Lemmas* ovate-lanceolate, usually mucronate; paleas 2-keeled containing a bisexual floret. *Lodicules* 3, membranous, generally obtuse, ciliate. *Stamens* 6; filaments free, often exserted; anthers narrow, tip obtuse, apiculate or panicillate. *Ovary* oblong or obovate, hairy at the apex. *Style* short or long; stigmas 1—3. *Grain* oblong or linear-oblong, furrowed on one side; pericarp thin, adhering; embryo conspicuous.

Thornless; culms 20—70 ft. high, 2—4 in. diam.; blade of culm-sheath sparingly hairy within; leaves 6—10 in. long, 7—1·5 in. wide; spikelets 1—3 in. long; lemmas 5—1 in. long; ovary hairy.....1. *Tulda*. Branches armed at the nodes with 2—3 recurved spines; culms 80—100 ft. high, 4—7 in. diam.; blade of culm-sheath densely felted with black or dark-purplish hairs within; leaves up to 8 in. long and 1 in. wide; spikelets 5—1 in. long; lemmas 2—35 in. long; ovary glabrous.....2. *arundinacea*.

1. *BAMBUSA TULDA*, Roxb.; F. B. I. vii. 387; Gamble Ann. Calc. vii. t. 29.

Vizagapatam District (Gamble); 1,500—2,000 ft.; Nundydroog (Rottler—perhaps cultivated).

Used for building, scaffolding and the making of mats and baskets. Vern. *Hind.* Peka; *Beng.* Tulda, Talda bans.

2. *BAMBUSA ARUNDINACEA*, Willd.; F. B. I. vii. 395; Roxb. Cor. Pl. t. 79; Bedd. Fl. Sylv. t. 321; Gamble Ann. Calc. vii. t. 48.

In all Districts; 100—4,000 ft. The Thorny Bamboo.

Used for buildings, scaffolding and for many domestic purposes; for floating heavy timber; the split culms are woven into mats, baskets, fans, etc. The grain when available is eaten by the poor. Vern. *Ur.* Konta bhanso; *Tel.* Veduru, Mulla veduru, Bongudu; *Tam.* Mungil, Periya mungil, Peru varai mungil; *Mal.* Mulla, Illi; *Kan.* Dongi, Bidungalu, Hebbidru.

130. *Teinostachyum*, Munro

Shrubs or trees. Culms rather slender, drooping above. Culm-sheaths usually thin; imperfect blades recurved. Leaves usually lanceolate, acuminate. Inflorescence of spicate panicles on leafy branches; the spikelets in bracteate verticels. Spikelets long, narrow, few—many-flowered, the upper and lower florets imperfect, the others bisexual. Glumes 1 or 2, ovate, mucronate. Lemmas similar with longer mucros; paleas convolute, 2-keeled, keels ciliate. Lodicules 3, conspicuous, 3—9-nerved, persistent. Stamens 6; filaments free; anthers exserted, obtuse or obtusely apiculate. Ovary ovate or depressed-globose, produced into a long beak enclosing the style; stigmas 2—3. Grain ovoid, acuminate, beaked; pericarp crustaceous, not adnate to the seed.

TEINOSTACHYUM BEDDOMEI, C. E. C. Fischer n. nom. *T. Wightii*, Bedd.; F. B. I. vii. 410; Bedd. Fl. Sylv. t. 323; Gamble Ann. Calc. vii. t. 87

Nilgiri and Travancore Hills; 3,000—5,000 ft

Culms semi-scandent, 10—20 ft. high, 1—1.5 in. diam.; ends of branches pendulous; culm-sheaths papery, 10—12 in. long; leaves oblong-lanceolate, 6—15 in. long, 1—2 in. wide; panicles large, terminal, drooping, branches spiciform; spikelets 5—1 in. long; glume solitary; lemmas 3—4, 2—3 fertile, the others incomplete. Flowers at long intervals and dies down.

Used by the jungle tribes for mats, baskets and fencing. Vern. *Tam.* Nanyura, Mai ita, Chittu.

131. *Oxytenanthera*, Munro

Scandent or small or medium-sized, unarmed, erect trees. Culms from a thick rhizome, usually creeping underground and stoloniferous. Culm-sheaths and imperfect blades usually narrow. Leaves usually small. Inflorescence a large panicle of spicate heads of few—many spikelets. Spikelets elongate, conical, 1—2—3-flowered, the uppermost usually fertile. Glumes 1—3. Lemmas elongate-ovate, mucronate; lower paleas 2-keeled, the uppermost convolute, only slightly or not at all keeled. Lodicules 0. Stamens 6; filaments united into a tube, thick at first, later membranous, exserted; anthers narrow, acute or apiculate. Ovary ovoid. Style fine; stigmas 1—3. Grain elongate, grooved, beaked by the persistent style; embryo conspicuous.

Glumes densely, often dark-ciliate, 1—1.6 in. long. Leaf-sheaths truncate and rigidly ciliate at the mouth. Spikelets 44—48 in. long; lemmas usually 4, densely ciliate above the middle; 28—46 in. long; grain 25—35 in. long

1. *nigrociliata* var. *Hohenackeri*.

Glumes not or sparingly pale-ciliate:—

Branches climbing, whip-like; culms hollow; culm- and sometimes leaf-sheaths with a separable, coriaceous, bristly ring at the mouth; spikelets .35—.5 in. long, 1-flowered; glumes and lemmas usually sparingly pale-ciliate on the margins; style hairy.....2. *monadelpha*.

Branches not whip-like even though straggling; culm- and leaf-sheaths without bristly ring; spikelets .6—1 in. long; glumes and lemmas eciliate:—

Culms solid or nearly so, densely velvety-tomentose; culm-sheaths thin, papery at the edges; leaf-sheaths without apical calluses; spikelets slender, long, spinose-apiculate, 1-flowered; style glabrous.....3. *monostigma*.

Culms hollow, glabrous; leaf-sheaths with 2 apical calluses; spikelets robust, 3-flowered; style hairy.....4. *Bourdillon*.

1. *OXYTENANTHERA NIGROCILIATA*, Munro; F. B. I. vii. 401.

Var. *Hohenackeri*, C. E. C. Fischer n. var.

Coorg near Mercara (Hohenacker); S. Kanara (Rhodes Morgan, G. F. F. Foulkes).

2. *OXYTENANTHERA MONADELPHA*, Alston. *O. Thwaitesii*, Munro; F. B. I. vii. 402; Bedd. Fl. Sylv. t. 322; Gamble Ann. Calc. vii. t. 64.

W. Ghâts from the Bababudan to the Travancore Hills; 3,500—6,000 ft.

Gregarious, subscandent, reed-like, 10—12 ft. high. Vern. Wattai (Anamallais—*Kadir*?).

3. *OXYTENANTHERA MONOSTIGMA*, Bedd.; F. B. I. vii. 462; Gamble Ann. Calc. vii. t. 65.

Coorg and Anamallai Hills.

Erect; culms up to 15 ft. high. Apparently rare.

4. *OXYTENANTHERA BOURDILLONI*, Gamble; F. B. I. vii. 403; Gamble Ann. Calc. vii. t. 67.

Travancore, near the Cochin boundary; among precipitous rocks; 3,000—5,000 ft. (Bourdillon).

Straggling, forming open clumps; 20—30 ft. high. Vern. *Tam. Kambu*; *Kan. Aramba*.

132. *Ochlandra*, Thwaites

Reed-like woody shrubs or small trees. *Culms* erect, internodes rather long, thin-walled. *Culm-sheaths* thin, persistent. *Leaves* many-veined, margins cartilaginous; sheaths striate, fringed. *Inflorescence* of spikes or spicate panicles terminating leafy branches; spikelets verticelled, some fertile, some sterile. *Spikelets* 1-flowered, often very large. *Glumes* 2—5, variable, usually mucronate. *Lemmas* similar to the uppermost glume, mucronate; paleas membranous, not keeled. *Lodicules* 1—several, conspicuous, variable, usually appressed to the filaments. *Stamens* 6—120; filaments free or united into a tube, exerted; anthers long, usually mucronulate. *Ovary* narrow. *Style* long; stigmas 4—6. *Grain* large or very large, ovoid, long-beaked, supported by the persistent glumes; pericarp very thick, fleshy.

Ligules short:—

Culm leaves 1.7 in. or less wide; inflorescence, when known, of short terminal spikes or spicate panicles on leafy branches; spikelets 1.2 in. or less long; filaments free:—

Culm-sheaths truncate with 2 falcate, long-ciliate auricles, their imperfect blades long-ensiform; spikelets .5—1.2 in. long, glabrous or with a few setae near

the apex of glumes and lemmas. Culms erect, up to 16 ft. high and 1 in. diam.; leaves 4—10 in. long, 4—1 in. wide; glumes 2—6 in. long; lemmas .85 in. long.....1. *scriptoria*.

Culm-sheaths, when known, attenuate into a needle-like blade; spikelets, when known, hirsute:—

Culms and culm-sheaths unknown. Leaves 5—8 in. long, 1—1.5 in. wide, mouth of sheaths with a rounded bristly auricle decurrent on either side; spikelets 1—1.5 in. long, covered with scattered, stiff, bulbous-based, spreading, brown hairs; glumes up to .7 in. long; lemmas up to 1.3 in. long
2. *Beddomei*.

Culms erect or straggling, up to 20 ft. high, .5—7 in. diam.; culm-sheaths persistent, thin, papery, gradually narrowed to a narrow apex, their imperfect blades needle-like, .7—1 in. long; leaves 4—9 in. long, .6—1.7 in. wide. Inflorescence unknown.....3. *setigera*.

Culm-leaves 6—18 in. long, 2—4.5 in. wide, mouth of their sheaths bearing stiff bristles; inflorescence a subverticillate, spicate panicle. Culms erect, 6—20 ft. high, 1—2 in. diam.; spikelets 2—2.5 in. long; glumes up to 2 in. long, mucronate; lemmas 2—2.2 in. long, usually mucous; filaments united

4. *travancorica*.

Ligules membranous, 1—1.8 in. long. Culms and culm-sheaths unknown; leaves 10—25 in. long, 1.5—4.5 in. wide, their sheaths rarely with a few deciduous bristles at the mouth; inflorescence a terminal verticillate spike with a thick rhachis; spikelets 1—1.7 in. long; glumes .44—1.2 in. long with a cusp .1—25 in. long; lemmas 1.4—1.6 in. long, mucronate.....5. *Wightii*.

1. *OCHLANDRA SCRIPTORIA*, C. E. C. Fischer n. comb. *O. Rheedii*, Gamble; F. B. I. vii. 418; Gamble Ann. Calc. vii. t. 107.

Malabar (Wight); Cochin (Johnston); Travancore; at low elevations. Growing in thick clumps on river banks.

Flowers sporadically every year and does not die down.

Used for mat and basket-making. Vern. *Mal.* Ammei, Ottal, Kolanji.

- Var. *sivagiriana*, Gamble; F. B. I. vii. 419; Gamble Ann. Calc. vii. t. 108.

Leaves and spikelets much larger; stamens more numerous, up to 60.

Pulney (Beddome) and Sivagiri Hills.

2. *OCHLANDRA BEDDOMEI*, Gamble; F. B. I. vii. 419; Gamble Ann. Calc. vii. t. 110.

Wynaad (Beddome).

3. *OCHLANDRA SETIGERA*, Gamble; F. B. I. vii. 420; Gamble Ann. Calc. vii. t. 115.

Nilgiri Hills at Gudalur at 3,000 ft. (Gamble).

4. *OCHLANDRA TRAVANCORICA*, Gamble; F. B. I. vii. 419; Gamble Ann. Calc. vii. t. 111. *Beesha travancorica*, Bedd. Fl. Sylv. t. 324.

Anamallai, Tinnevely and Travancore Hills; sea-level to 5,000 ft. Gregarious in evergreen forest, covering large areas with a dense growth. Flowers at long intervals and dies down.

In great demand locally for mat- and basket-making.

A coarse paper is made from it. The leaves are much eaten by elephants and can be fed to horses if grass is scarce. Vern. *Tam.* Eeral, Ecra-katti, Nanal, Odai; *Mal.* Eetta, Kar-eetta, Vei.

Var. *hirsuta*, Gamble ; F. B. I. vii. 420 ; Gamble Ann. Calc. vii. t. 112.
Leaves thicker, margins more cartilaginous, their sheaths with
appressed hairs from bulbous bases ; spikelets thickly clothed
with light-brown velvety pubescence.
Travancore Hills (Beddome).

5. *OCHLANDRA* WIGHTII, C. E. C. Fischer n. comb. *O. Brandisii*,
Gamble ; F. B. I. vii. 420 ; Gamble Ann. Calc. vii. t. 113.
Travancore ; at low elevations and up to 3,500 ft.
Much resembling the previous species.

FLORA
OF THE
PRESIDENCY OF MADRAS

J. S. GAMBLE

PART XI
ADDENDA, INDEXES, ETC.

BY
C. E. C. FISCHER
LATE OF THE INDIAN FOREST DEPARTMENT

WITH MAP

REPRINTED UNDER THE AUTHORITY
OF THE GOVERNMENT OF INDIA

CALCUTTA

1956

The supplementary note, explanatory of Part X, appeared as No. VIII in the 'Kew Bulletin' for 1935, p. 143. That for the present Part will be found on p. ix within.

CECIL E. C. FISCHER.

ROYAL BOTANIC GARDENS, KEW ;

9th September, 1935.

ADDENDA

p. 18, line 28 from the bottom, after fascicles add: or cymes.

For line 27 from the bottom, substitute:

Flowers in fascicles or cymes:—

Leaves not at all peltate:—

Petals 6; anthers opening by transverse slits, styles terete; drupes compressed
6. COCCULUS.

Petals 4—6; anthers opening by vertical slits; styles compressed; drupes
nearly terete.....6a. HYP SERPA.

Leaves peltate or subpeltate.....6b. PERICAMPYLUS.

p. 21, after line 11, insert:

6a. HYP SERPA, Miers

Climbing shrubs. *Leaves* elliptic, usually glabrous, 3-ribbed. *Flowers* in axillary racemes, dioecious. ♂ *Sepals* 8—12, 2—3-seriate, outer bractiform, inner 5—6 longer, imbricate. *Petals* 4—6, slightly smaller, fleshy. *Stamens* 6—10; anthers dehiscing vertically. ♀ *Sepals* 8, outer 2, bractiform, imbricate. *Petals* 5—6. *Staminodes* 6, clavate. *Ovaries* 6, rarely 3 or 2; style very short, excentric; stigma linear-oblong, deeply canaliculate. *Drupe*s 2—3, fleshy, transversely ovate; endocarp bony, subglobose, hardly compressed, slightly dorsally keeled, sides radially sulcate, cells lunate. *Seeds* conforming to the cells, back keeled, ventrally flat; embryo nearly annular, included in the fleshy albumen; cotyledons accumbent.

HYP SERPA CUSPIDATA, Miers *Limacia cuspidata*, Hook. f. & T.;
F. B. I. i. 100.

Madgole Hills, Vizagapatam District; 3,000—4,000 ft. (A. W. Lushington).

A woody climber; leaves ovate-oblong to oblong-lanceolate, acuminate, base rounded or acuminate, 2—5 in. long, 1—2.25 in. wide, glabrous, shining; drupes up to .5 in. long.

6b. PERICAMPYLUS Miers

Climbing shrubs. *Leaves* subrotund, peltate or subpeltate, 5—7-ribbed. *Flowers* in axillary cymes, dioecious. ♂ *Sepals* 9 in 3 series, the outer 3 bractiform, minute, inner series successively longer, imbricate. *Petals* 6, very much shorter. *Stamens* 6, embraced by the petals; anthers dehiscing transversely. ♀ *Sepals* 6. *Petals* 6, broader. *Staminodes* 6, filiform. *Ovaries* 3, gibbous; style short, thick; stigma linear, abruptly deflexed. *Drupe*s 3, gibbously ovate, fleshy; endocarp bony, suborbicular, compressed, dorsally crested and echinate; cells horseshoe-shaped. *Seeds* curved, radially sulcate; embryo slender, curved, included in the albumen, cotyledons incumbent.

PERICAMPYLUS INCANUS, Miers; F. B. I. i. 102.

Madgole Hills, Vizagapatam District; 3,000—4,000 ft. (A. W. Lushington).

A woody climber; leaves suborbicular, obtuse, acute or retuse, base truncate or subcordate, more or less peltate, 2—4 in. diam.; drupe red.

p. 51, after line 3, insert:

Var. *major*, Fyson in S. I. H. S. i. 49, a larger plant, much less branched; flower terminal and in the upper axils only.

Nilgiri Hills. Rare.

p. 59, for lines 9—12, substitute:

Axils of leaf-nerves nearly always furnished with glands:—

Nerves of leaves 4—5 pairs; wings of fruit 6—9 in. wide.....2. *racophloea*.
Nerves of leaves 6—12 pairs; wings of fruit 7—1 in. wide.....2a. *canarensis*.

Axils of leaf-nerves never furnished with glands:—

Leaves 5—9 in. long, 1.7—3 in. wide, apex blunt, nerves 7—9 pairs; petals .25 in. long; wings of fruit linear to linear-elliptic, 2.3—3.7 in. long, .5—7 in. wide.....3. *Wightiana*.

Leaves 2.2—4 in. long, 1—1.75 in. wide, acute or acuminate, nerves 4—8 pairs:—

Leaves elliptic-oblong to oblong-lanceolate, acute or acuminate, 2.5—4 in. long, 1—1.75 in. wide; petals .3—3.5 in. long, wings of fruit broadly oblong or oblong-spathulate, 1.75 in. long, .5 in. wide.....4. *glabra*.

Leaves ovate, caudate-acuminate, 2.2—3.4 in. long, 1—1.6 in. wide; nerves 5—6 pairs; petals 1.3—1.5 in. long.....5. *Jacobi*.

For lines 21—26, substitute:

2a HOPEA CANARENSIS, Hole in Ind. For. 1918, 575; Ind. For. Rec. vii, part iii, pl. 1.

S. Kanara (Lodge, McCarthy).

A large tree up to 8 ft. girth. Vern. *Kan. Malai Haiga*.

3. HOPEA WIGHTIANA, Wall.; F. B. I. i. 309; W. & A. 85; Ind. For. Rec. xx, part xv, pl. xiv.

Coorg, S. Kanara, Malabar and Travancore in semi-evergreen deciduous forest, up to 1,500 ft.

A small or moderate-sized tree with a brown wood of rather poor quality, seldom used except for fuel. Vern. *Kan. Nai Irupu*, Beribogi.

4. HOPEA GLABRA, W. & A. 85; F. B. I. i. 310; Bedd. Fl. t. 96; Ind. For. Rec. xx, part xv, pl. xv.

Evergreen forests of S. Kanara, Travancore and Tinnevely; 1,000—4,000 ft. A large tree with good timber used for railway sleepers and house building. Vern. *Tam. Kongu*; *Mal. Irumbakam*.

5. HOPEA JACOBI, C. E. C. Fischer in Kew Bull. 1932, 245.

Coorg (Jacob).

A small tree.

p. 66, for line 4 from the bottom, substitute:

Bracteoles 5, ovate; carpels glabrous or sparsely puberulous:—

Slender plants; corolla and androecium wholly yellow; carpels muricate, without spinules.....1. *procumbens*.

Robust plants, stems 24—40 in. high; corolla yellow with its centre and androecium dark-red-purple; carpels usually spinulose.....1a. *Coxii*.

p. 67, after line 6, insert:

- 1a. PAVONIA COXII, Tad. & Jac. in Journ. Ind. Bot. Soc. v. 11.
Anantapur (Gamble) and Coimbatore Districts.

p. 94, for lines 7 and 6 from the bottom, substitute:

Leaflets nearly glabrous:—

Bracts .08—.12 in. long, nearly glabrous; sepals .2 in. long, nearly glabrous;
seeds prominently ridged, not tubercled; pedicels 0—.1 in. long; stem generally
short.....1. *sensitivum*.

Bracts .2—.32 in. long, long-ciliate from tubercles; sepals .2—.28 in. long,
prominently ciliate from tubercles; seeds spirally ridged and tubercled on the
ridges.....1a. *longibracteatum*.

p. 95, between lines 7 and 8, insert:

Leaflets 15 or more pairs:—

After line 11, insert:

Leaflets 7—10 pairs, lower ovate, 1—2 apical pairs oblong, basal .5 in. long, .38 in.
wide, increasing upwards to 1.38 in. long, .62 in. wide; margins thickened

7. *insignis*.

After line 15, insert:

- 1a. BIOPHYTUM LONGIBRACTEATUM, Tad. & Jac. in Journ. Ind. Bot. Soc.
iv. 87.

Mundanthorai, Tinnevely District (Jacob).

After line 23 from the bottom, insert:

7. BIOPHYTUM INSIGNIS, Gamble in Kew Bull. 1921, 216.

Kodamadi, Tinnevely District (Ranga Achariyar, Jacob).

p. 96, for line 8, substitute:

Spur of lip incurved, tip inflated:—

Leaves quite glabrous, orbicular or reniform, apex not narrowed, lobes of wing-
petals subequal.....3. *Beddomei*.

Leaves pilose above, narrowed to the apex:—

Leaves thick, erect, suborbicular or ovate, base cordate, pilose above, basal-
lobe of wing-petals about half as long as the other two.....3a. *laticornis*.

Leaves thinly membranous, pendulous, elliptic to ovate-lanceolate, base usually
attenuate, sometimes rounded, more or less hairy above, distal- and basal-lobes
of wing-petals subequal, longer than the median.....3b. *dendricola*.

For line 11, substitute:

Spur of lip short:—

Flowers white, blue within; standard broader than long, crenate.....6. *crenata*.

Flowers purplish-red; standard boat-shaped, entire.....6a. *nilgirica*.

For line 17, substitute:

Lip spurless:—

Leaves erect, orbicular or broadly ovate, base equilateral, nerves flabellate;
wing-petals .35—.5 in. long:—

Leaves cordate; flowers reddish-brown; wing-petals 3-lobed, lobes broad,
rounded.....10. *orchioides*.

Leaves not cordate, flowers white; wing-petals 2-lobed, lobes very narrow,
almost filamentous.....10a. *Stocksii*.

Leaves pendulous, ovate or elliptic-ovate, base usually inequilateral, nerves pinnate;
wing-petals .7—1 in. long.....10b. *neo-Barnesii*.

For line 43, substitute:

Stem slender; basal-lobe of wings 0 or short, dorsal auricle filiform:—

Leaves rounded and cordate at base; basal-lobe of wings 0; spur of lip as long
as the rest of the flower.....19. *ligulata*.

Leaves narrowed at the base, not cordate; basal lobe of wings short, falcate;
spur of lip short, subsaccate.....19a. *Aliciae*.

p. 97, for line 7, substitute:

Flowers 33—5 in. long; lip with a short upcurved spur.....31. *tomentosa*.
Flowers 6—8 in. long; lip spurless.....31a. *rufescens*.

p. 98, for lines 21—23, substitute:

Spur of lip long, slender:—

Leaf-base rounded, cordate or emarginate, without glandular ciliae; lateral nerves nearly straight, ascending at a sharp angle; lip boat-shaped; seeds covered with long, spiral hairs.....61. *cordata*.

Leaf-base acute, with 1—3 glandular ciliae; lateral nerves strongly arched, nearly horizontal; lip bowl-shaped; seeds glabrous.....61a. *leptura*.

Spur of lip short:—

Leaves ciliate or apiculate between the marginal teeth:—

Spur of lip stout, tip incurved.....62. *uncinata*.

Spur of lip slender, straight.....63. *verecunda*.

Leaves ciliate or apiculate on the marginal teeth; spur very short, boss-like
63a. *anaimudica*.

For lines 34—35, substitute:

Lip tubiform:—

Flowers scarlet with yellow centre; standard winged on the back; lip narrowed to the long incurved, bugle-shaped, acuminate spur.....68. *phoenicea*.

Flowers scarlet with bright-green lip; standard not winged, its keel hollow; lip saccate, spur short tubular, blunt, upcurved and appressed to the lip
68a. *coelotropis*.

Lip cymbiform or funnel-shaped:—

Lip cymbiform or shortly funnel-shaped; spur short, straight or upcurved
69. *Wightiana*.

Lip deeply funnel-shaped; spur tubular, blunt, curved upwards in a semicircle
69a. *platyadena*.

After line 9 from the bottom, insert:

3a. *IMPATIENS LATICORNIS*, C. E. C. Fischer in Kew Bull. 1930, 154;
S. I. H. S. t. 59.

Nilgiri Kundahs; 8,000 ft. (Barnes).

On wet rocks and tree trunks. Flowers white with yellow or orange hairs or pink with magenta hairs.

3b. *IMPATIENS DENDRICOLA*, C. E. C. Fischer in Kew Bull. 1935, 157.

Coorg; on Thandiadamolu: 4,000 ft. (Barnes).

An epiphyte. Flowers white with a tuft of yellow or orange hairs.

p. 99, after line 3, insert:

6a. *IMPATIENS NILGIRICA*, C. E. C. Fischer in Kew Bull. 1931, 41;
S. I. H. S. t. 60.

Nilgiri Kundahs; 8,400 ft. (Barnes).

Among grass and on rocks.

After line 13, insert:

10a. *IMPATIENS STOCKSII*, Hook. f.; F. B. I. i. 442.

Coorg; on Thandiadamolu and Brahmagiri; 3,500 ft. (Barnes).

10b. *IMPATIENS NEO-BARNESII*, C. E. C. Fischer in Kew Bull. 1930, 330;
S. I. H. S. t. 62. *I. Barnesii*, C. E. C. Fischer *non* Hook. f. in Kew Bull. 1930, 153.

Nilgiri Kundahs; 8,000 ft. (Barnes).

An epiphyte. Flowers cream or nearly white.

p. 99, at the bottom, insert:

- 19a. *IMPATIENS ALICIAE*, C. E. C. Fischer in Kew Bull. 1934, 389.
Travancore; 2,000—5,000 ft. (Barnes).
Flowers deep-pink and white with purple streaks.

p. 100, after line 3 from the bottom, insert:

- 31a. *IMPATIENS RUFESCENS*, Benth, *ex* W. & A.; Wt. Ic. t. 969; S. I. H. S. t. 66.
I. tomentosa, Heyne var. *rufescens*, Hook. f.; F. B. I. i. 449.
Nilgiris, in swamps on the Downs.
Flowers rose-pink or purplish.

p. 103, at end of line 3, add:

- I. Ballardii*, Bedd.; F. B. I. i. 482.

After line 17, insert:

- 61a. *IMPATIENS LEPTURA*, Hook. f.; F. B. I. i. 467.
Travancore; 4,500—5,000 ft. (Beddome, Barnes).
Flowers pink and green.

After line 26, insert:

- 63a. *IMPATIENS ANAIMUDICA*, C. E. C. Fischer in Kew Bull. 1935, 92.
Travancore, on Anaimudi; 8,000 ft. (Barnes).
Flowers crimson.

p. 104, at the start, insert:

- 68a. *IMPATIENS COELOTROPIS*, C. E. C. Fischer in Kew Bull. 1934, 390.
Travancore, on Anaimudi; 6,500—7,500 ft. (Barnes).

After line 5, insert:

- 69a. *IMPATIENS PLATYADENA*, C. E. C. Fischer in Kew Bull. 1934, 393.
Travancore, on Anaimudi; 7,000 ft. (Barnes).
An undershrub. Flowers scarlet and cream.

p. 113, for lines 7—9, substitute:

Leaflets ovate, to ovate-lanceolate, acuminate, base rounded, 2—3 in. long, 1—1.5 in. wide; calyx-lobes 4:—

Branches not conspicuously zigzag; flowers fascicled, ovate in bud; calyx-lobes minute, triangular; stigma globose; berry apiculate.....3. *armata*.
Branches conspicuously zigzag; flowers solitary, cylindric in bud; calyx-lobes distinct, conspicuously auriculate; stigma oblate; berry globose, not apiculate

4. *Beddomei*.

After line 19, insert:

4. *PARAMIGNYA BEDDOMEI*, Tanaka in Journ. Bot. lxxviii. 230.
Anamalais (Beddome).

p. 116, for line 9, substitute:

Leaves simple:—

Small trees; leaves oblong, 4—10 in. long, glabrous; fruiting carpels winged

2. *SAMADERA*.

Small shrubs; leaves linear-spathulate, under 2 in. long; fruiting carpels wingless

2a. *SURIANA*.

p. 117, after line 11, insert:

2a. *SURIANA*, Linn.

Small shrub; branchlets thick, velvety-pubescent. *Leaves* linear-

spathulate, obtuse, velvety. *Flowers* hermaphrodite, terminal, hidden by the leaves. *Calyx* 5-partite, lobes imbricate. *Petals* 5, imbricate. *Disk* inconspicuous. *Stamens* 10, unequal, 5 sometimes barren. *Ovary* of 5 free carpels; styles basilar, filiform; ovules 2 in each carpel, lateral, ascending. Fruit of 5 or fewer carpels covered by the persistent calyx, unwinged. *Seed* solitary, exalbuminous.

SURIANA MARITIMA, Linn.; F. B. I. i. 522.

Krusadai Island near Pambam (Parthasarathy Iyengar).

An insipid littoral shrub.

p. 118, in line 19 delete "*l. squarrosa*." Before line 20, insert:

Anthers several times longer than the very short filaments.....*l. squarrosa*.

Anthers long, as long as or a little shorter than the slender, elongate filaments
la. Wallichii.

After line 14 from the bottom, insert:

la. OCHNA WALLICHII, Planch.; F. B. I. i. 524.

Kollimalais in the Salem District (Latham).

Closely resembling *O. squarrosa*, Linn.

p. 190, after line 19 from the bottom, insert:

Var. *cuneifolia*, DC.; F. B. I. ii. 31. Leaves cuneate at the base, often tomentose beneath.

S. Malabar District; S. Coimbatore District in the Anamalais;

Madura District; 800—2,500 ft. (Fischer). Vern. *Tam.* and *Mal.* Cheru.

p. 346, for lines 8—5 from the bottom, substitute:

Tufts of bristles sessile as are the appendages:—

Branchlets terete, fleshy, glabrous, bluish when dry; leaves oblong-lanceolate, 1—1.5 in. long, .3—5 in. wide, 3-ribbed, lineolate on the upper, nearly glabrous on the lower surface; calyx-lobes ovate, obtuse, bristly at apex, ciliate on the margins.....*7. sublaevis*.

Branchlets quadrangular, not fleshy nor bluish, hairy from bulbous bases; leaves ovate-lanceolate, acute at both ends, 1.4 in. long, .6—1 in. wide, 3-ribbed with an extra lateral nerve on each side from the base; calyx-lobes triangular, their apices and those of the appendages stellate-setose.....*7a. rosea*.

p. 348, after line 18, insert:

7a. OSBECKIA ROSEA, Fyson in Journ. Ind. Bot. Soc. 1932, 49; S. I. H. S. t. 172.

Nilgiri Hills (Fyson).

A small, erect shrub. Flowers pink without trace of purple.

p. 351, for lines 30—32, substitute:

Leaves with one slender pair of nerves from the base:—

Leaves oblong-lanceolate, 1—1.5 in. long, base equilateral, one stronger pair of nerves above the base, bristly-hairy on both sides; capsule smooth, ribbed.....*2. Clarkei*.

Leaves lanceolate, 1.6—4.4 in. long, base very inequilateral, several pairs of nerves above the basal, glabrous or with a few crisped hairs on the nerves; capsule smooth, corky, bluntly 6-ribbed.....*2a. tinnevelliensis*.

For lines 4—1 from the bottom, substitute:

Leaves 3- or 5-ribbed:—

Leaves lanceolate, acute, base narrowed, shortly auricled, conspicuously 3-ribbed from the tip of the short petiole, up to 1.5 in. long; .6 in. wide, sharply serrate,

glabrous; calyx-tube purple, glabrous, smooth, in fruit funnel-shaped from a thick pedicel; petals not clawed.....8. *grandiflora*.
 Leaves ovate to ovate-lanceolate, acute, base rounded, 5-ribbed, ribs connected by obliquely transverse veins, 1—2.2 in. long, .5—1.2 in. wide, sharply, evenly and rather deeply serrate; petioles .16—1.2 in. long; calyx-tube white; petals shortly clawed.....8a. *nemakadensis*.

p. 352, after line 28, insert:

- 2a. *SONERILA TINNEVELLIENSIS*, C. E. C. Fischer in Kew Bull. 1934, 165.
 Travancore (Beddome); Tinnevely District (Barber, Barnes);
 2,000—4,000 ft.
 An erect undershrub. Petals pinkish-mauve.

p. 353, after line 11, insert:

- 8a. *SONERILA NEMAKADENSIS*, C. E. C. Fischer in Kew Bull. 1935, 157.
 Travancore; 6,500 ft. (Barnes).
 A glabrous herb 4—12 in. high. Petals pink-purple.

p. 364, for lines 2—1 from the bottom, substitute:

Erect plants of wet places; petals 4, yellow; seeds with a prominent raphe:—
Leaves and usually the stems and branches hairy; capsules robust, all the seeds alike:—

Sepals and petals .25—4 in. long, not conspicuous; capsules cylindric or narrowly turbinate:—

Stems more or less 4-ribbed, glabrous or hispidulous above; leaves spatulate, linear-lanceolate or narrowly oblong, rounded, acute or acuminate, base cuneate or acuminate, 1.5—3 in. long, .3—6 in. wide, hispidulous; petioles very short, up to .3 in. long, hispidulous; sepals oblong-lanceolate, acute, hispidulous on the 5 ribs outside; petals obovate, .2—2.5 in. long; capsules cylindric, terete, slightly fluted, 1—1.7 in. long, hispidulous...2. *suffruticosa*.
 Stems terete or bluntly angled, grey-villous; leaves narrowly elliptic, narrowed at both ends, usually blunt, 1—2 in. long, .3—5 in. wide, grey-villous; petioles 0—1.5 in. long, villous; sepals ovate, acuminate, .25—4 in. long, villous outside, puberulous within; petals obovate, .3—4 in. long; capsules narrowly turbinate, terete, .8—1 in. long, grey-villous.....3. *villosa*.

Sepals ovate, long-cuspidate, .5 in. long, brown-tomentose without; petals rotund, shortly clawed, .8—1 in. diam. Stems terete or bluntly angled, brown- or rufous-tomentose; leaves elliptic-lanceolate, acuminate at both ends, 1.8—4.5 in. long, .6—1.3 in. wide, crisped-hairy on both faces; petioles .3—6 in. long, brown-tomentose; capsules obcuneate, 4-angled, .8—1 in. long, brown-tomentose.....4. *speciosa*.

Glabrous, branches slender, usually narrowly winged; leaves lanceolate, narrowed at both ends, .5—3 in. long, .25—5 in. wide; sepals very narrow, .08—1 in. long; petals shorter; capsules linear, slender, terete, .6—8.5 in. long, seeds in the lower part differing from the upper and 1-seriate.....5. *linifolia*.

p. 365, for lines 6—10, substitute:

2. *JUSSIEUA SUFFRUTICOSA*, Linn.; F. B. I. ii. 587 in part.
 Mysore, Carnatic, Malabar, Anamallais (Bedd.).
 1—2 ft. high. Vern. *Mal. Karambu* (*fide* Rheede).
3. *JUSSIEUA VILLOSA*, Lam. *J. suffruticosa*, Clarke non Linn.; F. B. I. 587 in part.
 Mysore, Carnatic, S. Kanara; Anamallai, Sirumalai and Pulney Hills; near sea-level to 4,800 ft.
 2—3 ft. high.

4. *JUSSIEUA SPECIOSA*, Ridl. in Journ. Bot. 1921, 259. *J. suffruticosa*, Clarke non Linn.; F. B. I. 587 in part.
Wynaad; 3,000—4,000 ft. (Gamble, Bourne).
4—6 ft. high; flowers conspicuous.

5. *JUSSIEUA LINIFOLIA*, Vahl.
Kuthuparamba in N. Malabar District.
1—2 ft. high, slender.
Presumably introduced from America.

p. 414, for lines 20—18 from the bottom, substitute:

Branchlets glabrous; leaves elliptic to elliptic-lanceolate; petioles about 1 in. long; stipules short; corolla tube 2 in. or more long:—

Ultimate twigs and rhachis of inflorescence puberulous; flowers 2—25 in. long
2. *glabrata*.

Ultimate twigs and rhachis of inflorescence glabrous; flowers 4—45 in. long
2a. *Gamblei*.

p. 415, after line 13, insert:

- 2a. *WENDLANDIA GAMBLEI*, Cowan in Not. Bot. Gard. Edin. xvi. 271.

Ganjam District on Mahendragiri at 4,600 ft.; Vizagapatam District at Ventala; Rampa Hills at 2,000 ft.

A small glabrous tree.

After line 26, insert:

Subsp. *cinnamomea*, Cowan in Not. Bot. Gard. Edin. xvi, 266.
Receptacle lobed; calyx puberulous, not hirsute; leaves cinnamon-coloured below when dry.

Hyderabad State; Kurnool and Nellore Districts.

- p. 446.** 30. *PAVETTA*, Linn.

Dr. C. E. B. Bremekamp has recently made a critical study of this genus and has published a monograph in Fedde's 'Repertorium', xxxvii (1934), pp. 1—208. He has kindly furnished me with an extract and key comprising the species found in S. India and, with his kind permission, the following has been adapted from it and may be substituted for p. 446 (last 34 lines), and the first 32 lines of p. 447. References to the monograph are made under the initials F. R. followed by the page number.

Inflorescence axillary:—

Leaves lanceolate, nerves 10—12 pairs; corolla-tube 26—32 in. long

1. *travancorica*.

Leaves elliptic, nerves less than 10 pairs; or if more than 10 pairs, then corolla-tube 5 in. or more long:—

Nerves 10—12 pairs; corolla-tube 5—56 in. long.....2. *concanica*.

Nerves 6—9 pairs; corolla-tube 26—32 in. long.....3. *laeta*.

Inflorescence terminal:—

Flowering shoots green:—

Calyx-lobes keeled. Flowers large:—

Leaves coriaceous:—

Leaves obovate, puberulous below, nerves 6—8 pairs. Shoots and petioles pubescent.....4. *zeylanica* var. *puberula*.

Leaves oblong or narrowly obovate, scabrid below, nerves 9—10 pairs. Shoots and petioles glabrous.....5. *calophylla*.

Leaves subcoriaceous, usually rather thin:—

Glabrous or subglabrous plants:—

Leaves oblong or elliptic, nerves 6—7 pairs.....6. *siphonantha*.

- Leaves oblanceolate, nerves 8—11 pairs.....7. *oblanceolata*.
 Leaves pubescent or scabrid-pubescent below:—
 Leaves oblong to obovate, nerves 5—6 pairs; inflorescence pubescent.....8. *praeterita*.
 Leaves lanceolate or elliptic, nerves 7—8 pairs; inflorescence hispidulous or puberulous:—
 Leaves lanceolate; inflorescence lax, hispidulous.....9. *hispidula*.
 Leaves elliptic; inflorescence contracted, puberulous...10. *madrassica*.
 Calyx-lobes not keeled, often reduced to teeth:—
 Calyx lobed:—
 Calyx-lobes twice as long as broad. Inflorescence puberulous.....11. *Wightii*.
 Calyx-lobes about as long as broad:—
 Undershrub; leaves oblanceolate or narrowly obovate, acuminate, nerves 8—9 pairs; corolla-tube .6 in. long.....12. *nemoralis*.
 Shrub; leaves lanceolate, obtuse or subacute, nerves 5—7 pairs; corolla-tube .18—5 in. long.....13. *blanda*.
 Calyx toothed:—
 Flowering-shoots consisting of a single internode, often covered with cork in the lower part:—
 Leaves elliptic; corolla about .46 in. long.....14. *breviflora*.
 Leaves obovate or oblanceolate; corolla more than .8 in. long.....15. *Hohenackeri*.
 Flowering-shoots comprising more than one internode:—
 Leaves lanceolate or oblong, glabrous.....16. *Thomsonii*.
 Leaves obovate, pubescent on the nerves below.....17. *bengalensis*.
 Flowering-shoots covered with cork up to the inflorescence:—
 Stipules over .4 in. long; calyx-lobes over .06 in. long.....18. *Brunonis*.
 Stipules under .4 in. long; calyx-lobes under .03 in. long:—
 Flowering-shoots peduncle-like, either consisting of a single internode or the lowest internode much longer than all the others together; calyx-lobes .024 in. long.....19. *tomentosa*.
 Internodes of the flowering-shoots gradually decreasing in length from the base up; calyx-lobes .008 in. long.....20. *indica*.
1. PAVETTA TRAVANCORICA, Brem. in F. R. 81. *P. indica* Linn. var *minor*, Hk. f.; Fl. Madr. 633 in part.
 Travancore (Wight).
 2. PAVETTA CONCANICA, Brem. in F. R. 81.
 Attraimalais (Beddome).
 A glabrous shrub, older branchlets grey.
 3. PAVETTA LAETA, Brem. in F. R. 82. *P. indica* Linn.; Fl. Madr. 633 in part.
 Nilgiri (Perrottet) and Pulney (Saulière) Hills.
 Very similar to the last species.
 4. PAVETTA ZEYLANICA, Gamble.
 Var. *puberula*, Brem. in F. R. 90. *P. zeylanica* Gamble in part; Fl. Madr. 633.
 Courtallam (Beddome).
 5. PAVETTA CALOPHYLLA, Brem. in F. R. 90. *P. zeylanica*, Gamble in part; Fl. Madr. 633.
 Nilgiri Hills (Gamble).
 A glabrous shrub.
 6. PAVETTA SIPHONANTHA, Dalz. *P. hispidula*, W. & A.; Fl. Madr. 633 in part.
 Mangalore (Hohenacker); Travancore, 150 ft. (Venkoba Rao).
 A glabrous shrub.

7. PAVETTA OBLANCEOLATA, Brem. in F. R. 91.
Palghat and Attraimalai Hills (Beddome).
A glabrous shrub; inflorescence subsessile.
8. PAVETTA PRAETERITA, Brem. in F. R. 92. *P. hispidula*, W. & A.;
Fl. Madr. in part.
Courtallam, Quilon (Wight).
A shrub with scabrid-pubescent twigs.
9. PAVETTA HISPIDULA, W. & A.; Fl. Madr. 633.
W. Ghâts.
10. PAVETTA MADRASSICA, Brem. in F. R. 91. *P. indica*, Linn. var.
tomentosa, Hook. f.; Fl. Madr. 633 in part.
Simhachallam, Vizagapatam District (Elliot).
11. PAVETTA WIGHTII, Hook. f.; Fl. Madr. 634.
W. Ghâts, E. side of Nilgiri Hills; 4,000—6,000 ft.
A shrub with rather large obovate leaves, prominently glandular.
12. PAVETTA NEMORALIS, Brem. in F. R. 94.
Cochin State at Kavalai (Meebold).
A glabrous, unbranched undershrub.
13. PAVETTA BLANDA, Brem. in F. R. 94. *P. indica*, Linn. var. *minor*,
Hook. f.; Fl. Madr. 633 in part. *P. breviflora*, DC. var. *sub-*
coriacea, Gamble; Fl. Madr. 634.
W. Ghâts; 4,000—6,000 ft.
A glabrous shrub; stipules persistent.
14. PAVETTA BREVIFLORA, DC.
Var. *glaberrima*, Brem. in F. R. 98. *P. breviflora*, DC.; Fl. Madr.
634 in part. All parts glabrous; calyx not ciliate.
Nilgiri Hills; 4,500—6,000 ft. (Leschenault, Gamble).
Var. *ciliolata*, Gamble ex Brem. in F. R. 98. *P. breviflora*, DC.;
Fl. Madr. 634 in part. Leaves ciliate on the nerves below; calyx
ciliate.
Nilgiri Hills; 5,000—7,000 ft. (Wight, Gamble).
Var. *pubescens*, Brem. in F. R. 98. *P. breviflora*, DC.; Fl. Madr.
634 in part. Leaves above sparsely, below densely pubescent; inflores-
cence densely pubescent.
Nilgiri (Perrottet) and Pulney (Bourne) Hills.
15. PAVETTA HOHENACKERI, Brem. in F. R. 98. *P. indica* Linn.; Fl.
Madr. 633 in part.
Nilgiri Hills near Sispara (Hohenacker).
A glabrous shrub.
16. PAVETTA THOMSONII, Brem. in F. R. 99. *P. indica*, Linn.; Fl.
Madr. 633 in part.
Carnatic (G. Thomson).
A glabrous shrub; corolla-tube sparingly pilose within.
Var. *glaberrima*, Brem. in F. R. 99. Inflorescence glabrous.
Mysore (G. Thomson); Pondicheri (Perrottet).
Var. *puberula*, Brem. in F. R. 99. Inflorescence puberulous.
Shevagiri Hills (Wight); Travancore at Kottayam (Hobenacker).
17. PAVETTA BENGALENSIS, Brem. in F. R. 99. *P. indica*, Linn.; Fl.
Madr. 633 in part.

Mangalore (Hohenacker).

A glabrous shrub.

18. PAVETTA BRUNONIS, Wall.; Fl. Madr. 634.

W. Gháts, N. and W. slopes of Nilgiris at 5,000—6,000 ft.

A softly-tomentose shrub.

19. PAVETTA TOMENTOSA, Linn.; *P. indica* Linn. var. *tomentosa*, Hook. f.; Fl. Madr. 633 in part.

All forest Districts.

20. PAVETTA INDICA, Linn.; Fl. Madr. 633 in part.

Coromandel.

Var. *glabra*, Brem. in F. R. 119.

Coromandel.

Var. *mollis*, Brem. in F. R. 119.

Cuddapah District (Gamble).

p. 471, for lines 4—1 from the bottom, substitute:

Outer involucre bracts long-aristate, spreading or reflexed. Stem brown-pubescent; leaves crenate-serrulate, mucronate:—

Stem terete, strongly ribbed; leaves elliptic-ovate or lanceolate, up to 5.5 in. long and 2.7 in. wide, rugose, reticulate, scabrous; petioles .2—5 in. long; involucre bracts spreading; achenes narrowly turbinate, .12—15 in. long; pappus reddish.....14. *peninsularis*.
Stem quadrangular; leaves ovate or ovate-oblong, 2.4—3.5 in. long, 1—1.6 in. wide; petioles about .2 in. long; involucre bracts recurved; achenes clavate-turbinate; .1 in. long; pappus yellowish.....14a. *recurva*.

p. 473, for lines 13—15, substitute:

Stem and leaves pubescent; leaves thin, often large, outer pappus-hairs very short:—
Stem terete; leaves lanceolate to ovate-lanceolate, acuminate, sharply serrate, densely pubescent below, up to 4 in. long and 2.2 in. wide.....29. *conyzoides*.
Stem quadrangular; leaves membranous, elliptic, shortly acuminate, serrate-dentate, teeth hardened, puberulous on the nerves below, usually about 4 in. long, and 1.4 in. wide, but sometimes up to 7.5 in. long and 2.6 in. wide

30. *membranacea*.

p. 474, after line 21 from the bottom, insert:

- 14a. VERNONIA RECURVA, Bedd. ex S. Moore in Journ. Bot. 1925, 171. Anamalais at 6,000 ft. (Beddome).

p. 475, after line 4 from the bottom, insert:

30. VERNONIA MEMBRANACEA, Bedd. ex S. Moore in Journ. Bot. 1925, 170.

Nilgiri Hills at Sispara; Attrimalais (Beddome).

p. 476, after line 23, insert:

Leaves elliptic-lanceolate to broadly ovate, reticulate veins obscure, midrib below glabrous or only very slightly rusty-puberulous; ripe achenes glandular-warted

1. *Lavenia*.

Leaves deltoid-ovate, reticulate veins distinct, midrib below rather densely rusty-pubescent; ripe achenes glabrous and smooth.....2. *reticulatum*.

In line 24 insert "1" before ADENOSTEMMA.

After line 32, insert:

2. ADENOSTEMMA RETICULATUM, DC. *A. viscosum*, Forst. var. *reticulatum*, C. B. Clarke; F. B. I. iii. 243.

Nilgiri Hills and Courtallam.

Very similar to *A. Lavenia*, O. Kze.

After line 7 from the bottom, insert:

*Leaves ovate, deltoid-ovate or rhomboid-ovate; heads 60—75-flowered; involucre subglabrous; corolla .04—.06 in. long.....1. *conyzoides*.
Leaves deltoid; heads 75—100-flowered; involucre hirsute; corolla .1—.12 in. long; style-branches only exserted.....2. *Houstonianum*.

In line 6 from the bottom, insert "1" before *AGERATUM*.

After last line, insert:

2. *AGERATUM HOUSTONIANUM*, Mill.

Nilgiri and Pulney Hills; 4,500—6,500 ft.

p. 504, for lines 31—34, substitute:

Stems and leaves soft and slightly fleshy:—

Leaves mostly cauline, oblong-lanceolate, acuminate, serrate, 4—8 in. long, 2—3 in. wide, green below; heads .5—.66 in. long, bracts as long, narrow; corolla-tube slender, .3 in. long; achenes sparsely hairy.....2. *Walkeri*.
Leaves mostly radical, obovate, obtuse, irregularly toothed, 2.4—3.2 in. long, 1—2 in. wide, violet below; heads .3—.5 in. long, bracts .2—.32 in. long, linear; achenes pubescent.....3. *shevaroyensis*.

At foot of the page, insert:

3. *NOTONIA SHEVAROYENSIS*, Fyson in Journ. Ind. Bot. 1932, 49; S. I. H. S. t. 290.

Shevaroy Hills, in swamps; 4,500 ft. (Fyson).

A scapigerous, glabrous herb up to 3 ft. high. Corymbs large, yellow.

p. 506, after line 15 from the bottom, insert.

Involucral-bracts 8; florets 8—15, rarely fewer:—

After line 8 from the bottom, insert:

Involucral-bracts 5; florets 5, rarely 6. Leaves broadly ovate, abruptly acuminate, base rounded or slightly cordate, 2—4 in. long, 1.2—3.2 in. wide, hoary-tomentose below.....15a. *Ansteadii*.

p. 508, after line 7 from the bottom, insert:

15a. *SENECIO ANSTEADI*, Tad. & Jac. in Journ. Ind. Bot. Soc. 1930, 40.

Tinnevely Hills; 3,000 ft. (Jacob).

A slender, shrubby climber.

p. 515, to species run wild add *Erechthites valerianifolia*, DC., which has escaped in the Madura Hills and in Travancore.

p. 605, after line 17, insert:

Apical part of corolla-lobes folded back along the middle, purplish, basal part greenish or yellowish:—

After line 22, add:

Corolla-lobes expanded and dark-purplish or -brownish throughout, mucronate, bearing deciduous stoutly spindle- or club-shaped purple hairs near the tips and along the margins.....2a. *stalagmifera*.

For line 31, substitute:

Umbels few-flowered:—

Branches erect; corolla within pale-green, covered with purple hairs, margins fringed.....7. *indica*.

* Extracted from 'The Compositae of the Malay Archipelago,' by J. T. Kusters (1935), 'I. Vernoniae and Eupatoriae,' p. 484.

Branches procumbent; corolla within whitish with concentric purple streaks, glabrous, not fringed.....7a. *procumbens*.

After line 6 from the bottom, insert:

2a. *CARALLUMA STALAGMIFERA*, C. E. C. Fischer in Kew Bull. 1935, 430; Bull. Madr. Gov. Mus. iv. i; t. 1, figs. 4—6.

Vizagapatam and Chingleput Districts; Pudukottai State (Mayuranathan).

An erect, fleshy herb with slender branches.

p. 606, after line 22 from the bottom, insert:

7a. *CARALLUMA PROCUMBENS*, Grav. & Mayur. in Bull. Madr. Gov. Mus. iv, i, 26; t. iv, figs. 13—17.

S. Travancore (Mayuranathan).

Trailing and rooting among rocks, the stem continues to grow after flowering from just below the inflorescence, the latter then appearing lateral.

p. 629, for lines 22—18 from the bottom, substitute:

Branches twiggy, radiating from the root-stock, procumbent or slightly ascending, appressed-hirsute:—

Leaves ovate- or linear-lanceolate, strigosely hirsute, margins flat, .25—.75 in. long; flower-spikes usually very short but sometimes up to 1 in. long; fruit depressed, nutlets subglobose, not horned, bristly.....10. *scabrum*.
Leaves ovate- or oblong-lanceolate, rigidly hirsute, .12—.32 in. long; flowers distant on short extra-axillary branchlets; fruit conspicuously beaked, quadrangular, nutlets shortly, bluntly horned above the base, villous.....11. *cornutum*.

p. 630, at the foot, insert:

11. *HELIOTROPIMUM CORNUTUM*, Johnst. in Contr. Gray Herb. xcii. 90.

Mangalore (Hohenacker).

Very closely resembling *H. scabrum*, Retz. and confused with it.

p. 697, after line 19, insert:

Var. *pusilla*, C. B. Clarke; F. B. I. iv. 369. Small, nearly glabrous herb.

Coorg, near Mercara (Barnes).

p. 827, after line 20, insert:

Chenopodium Moquinianum, Aellen has been found near Madras and is reported to be spreading.

p. 894, at the foot, add:

E. geniculata, Orteg., an American weed, has escaped from gardens round Bangalore and at Nanjangode in Mysore State and is stated to be spreading (Mayuranathan).

p. 959, for line 28, substitute:

Leaves serrate:—

Leaves opposite; stigma ovate, persistent.....9. *CHAMABAINA*.

Leaves alternate; stigma linear, deciduous.....9a. *DISTEMON*.

p. 966, after line 3, insert:

9a. *DISTEMON*, Wedd.

Slender, erect, annual herbs. *Leaves* alternate, petioled, coarsely toothed, 3-nerved and penninerved. *Flowers* monoecious, in small,

bracteate, 3-flowered, androgynous clusters forming slender axillary and long terminal spikes. *Perianth* of ♂ campanulate, 2—3-fid, valvate; of ♀ tubular, ventricose. *Stamens* 2—3. *Pistillode* woolly. *Ovary* included in and more or less adnate to the perianth; stigma linear, deciduous; ovule erect. *Achene* broadly ovoid, acuminate, enclosed in the thickened fleshy or crustaceous perianth; pericarp fragile. *Seeds* copiously albuminous; cotyledons broad.

DISTEMON INDICUM, Wedd.; F. B. I. v. 588.

Upper Godavari (Mayuranathan).

A slender herb 2—3 ft. high; stem subquadrangular. Leaves broadly ovate, acuminate, base cuneate or less often rounded or subcordate, patchy beneath with whitish, cobwebby pubescence between the hairy nerves, 2—3 in. long.

p. 974, for lines 11—18, substitute:

Bracts of ♂ not exceeding .04 in. long, more or less recurved at the edges; fruit very fleshy, pruinose, oblong, obtuse or shortly apiculate, longitudinally wrinkled when dry, 1.2—1.6 in. long, .6—8 in. diam.....1. *ula*.
Bracts of ♂ cylindric, .08 in. long, margins appressed; fruit hardly fleshy, not pruinose, ovate-oblong, narrowed into a pronounced beak, smooth when dry, 1.2—1.4 in. long, .6 in. diam.....2. *contractum*.

1. *GNETUM ULA*, Brogn. *G. scandens*, Hook. f. non Roxb. in part; Fl. Madr. 1392 in part; *G. funiculare*, B. Sm.; Wt. Ic. t. 1955.

In most Districts; up to 4,500 ft.

A large robust climber. Bark thick, brown, rough with scales. Branchlets slender with thickened nodes. Leaves ovate-oblong or elliptic, 3—7 in. long, 1.6—4 in. wide. Ripe fruit reddish-orange. Vern. *Tam. Ana-pendu*.

2. *GNETUM CONTRACTUM*, Markgr. in Bull. Jard. Bot. Buit. ser. iii. x. 470. *G. scandens*, Hook. f. non Roxb. in part; Fl. Madr. 1392 in part.

Nilgiri Hills at 5,000 ft.; Quilon (Wight).

Hardly to be distinguished from the previous species in the vegetative parts, the leaves are usually smaller, up to 4 in. long and 2 in. wide, with more defined nerves and the ♂ spikes rather stouter.

p. 976, for lines 14 and 13 from the bottom, substitute:

Salt-water, submerged herbs:—

Leaves under 6 in. long, ovate or oblong, in pairs from the axil of a scale; ♂ spathe 1-flowered; perianth single.....6. *HALOPHILA*.
Leaves 2—3 ft. long, narrowly linear, 2—3 enclosed in a basal sheath; ♂ spathe many-flowered; perianth double.....7. *ENHALUS*.

p. 979, for lines 7—11, substitute:

Leaves thinly membranous, elliptic to oblanceolate, base more or less decurrent, smooth, 1.5—3 in. long, .35—.55 in. wide; petioles up to 2.7 in. long.....1. *ovalis*.
Leaves firm, elliptic to elliptic-ovate, base rounded or cuneate, not decurrent, minutely papillose, .4—7 in. long, .2—2.2 in. wide; petioles .35—1 in. long

2. *Balfouri*.

1. *HALOPHILA OVALIS*, Hook. f. *H. ovata*, Gaud.; F. B. I. v. 663; Fl. Madr. 1398 in part.

Along the coasts and in back-waters.

A slender, creeping herb.

2. HALOPHILA BALFOURI, Solered. *H. ovata*, Gaud.; Fl. Madr. 1398 in part.

Along the E. Coast.

Similar to the previous species but smaller.

7. ENHALUS, Rich.

Submerged monoecious or dioecious, marine herbs; rootstock crinite with the remains of old leaves. *Leaves* narrowly linear, enclosed in twos or threes in a basal sheath. ♂ *flowers* many, minute, enclosed in a short, compressed, subsessile, 2-leaved spathe. *Sepals* and *petals* 3, broadly elliptic. *Stamens* 3. *Pistillode* 0. ♀ *flowers* much larger, solitary, sessile in a longer spathe on a spiral scape. *Sepals* 3, oblong, imbricate. *Petals* 3, longer, linear. *Ovary* ovoid, long-beaked, almost 6-celled; styles 6, bipartite; ovules anatropous, few on each placenta. *Fruit* ovoid, beaked, indehiscent. *Seeds* few, large, cone-like, testa mucilaginous.

ENHALUS ACOROIDES, Rich. ex Steud. *E. Koenigii*, Rich.; F. B. I. v. 663.

Pambam (Parthasarathy Iyengar).

Rootstock creeping in sand. *Leaves* 2—3 ft. long, .5—.75 in. wide.

♀ *spathes* up to 2 in. long, strigose.

p. 1020, for lines 12—14, substitute:

Lip 3-lobed obovate, in the lower $\frac{2}{3}$ the sides bent up to form a tube.

Flowers about .9 in. long:—

Leaf lobed a little above the middle, midlobe emarginate, glabrous, not fimbriate.

Leaf ovate-cordate, acute or acuminate.....2. *biflora*.

Lip lobed near the apex, midlobe and sometimes also the smaller side lobes fimbriate, beset with white hairs, the midlobe with tubular, sometimes branched processes on the 3 median nerves. Leaf orbicular-cordate, obtuse

2a. *monantha*.

After line 33, insert:

- 2a. NERVILIA MONANTHA, Blatt. in Journ. Bomb. Nat. Hist. Soc. xxxv. 724.

Biligirirangan Hills, 5,000 ft. (Mayuranathan).

Perianth pale-violet (N. Kanara specimens greenish-white with a rosy tinge, the nerves of the midlobe purplish).

- p. 1025, line 2 & 3, for "spike 2—4 in. long," substitute "spike 1—6 in. long"; line 4, for "lower 1 in. long," substitute "lower .7—1.25 in. long"; line 5, after "obtuse" add "ovary beakless:—" and for lines 6 and 7, substitute:

Perianth-lobes not spreading; side lobes of lip usually shorter than the broader midlobe, not diverging; spur less than .4 in. long, shorter than the ovary

20. *Heyneana*.

Perianth-lobes spreading; side lobes of lip as long and wide as the midlobe, diverging nearly at right angles; spur .68—.72 in. long, as long as the ovary

20a. *Barnesii*.

- p. 1026, in line 18, after "spur," for ":", substitute "—:" and for the rest of that line and the next four substitute:

Sepals erect, ovate-oblong, obtuse, concave, .5—.7 in. long; petals as long, linear, obtuse; lip as long, coriaceous, cuneately obovate, obtuse, claw geniculate, 3-lobed for less than $\frac{1}{4}$ its length, side lobes linear-oblong, obtuse, incurved, shorter than the triangular-ovate midlobe; spur subclavate, about as long as the ovary

28. *Perrottetiana*.

Sepals spreading, lanceolate, slightly falcate, obtuse or subacute, flat, 4—5 in. long; petals shorter, linear-ensiform, subfalcate, sub-acute, lip as long as the sepals, coriaceous, sessile, divided nearly to the base into 3 subequal acute lobes, midlobe linear-oblong, side lobes narrowly lanceolate; spur hardly longer than the sepals, shorter than the ovary.....29. *flabelliformis*.

p. 1028, after line 12, insert:

20a. *HABENARIA BARNESII*, Summerhayes n. sp.

Nilgiri Hills at Gudalurmalai (Barnes 890); Travancore at Nemakad Gap (Barnes 814 in part).

Affinis *H. Heyneanae*, Lindl., a qua tepalis patentibus, labelli lobis lateralibus longioribus ab intermedio fere angulo recto divergentibus recurvis, calcar apice dilatato 17—18 mm. longo, staminodiis fere duplo majoribus differt.

p. 1028, after line 9 from the bottom, add:—

29. *HABENARIA FLABELLIFORMIS*, Summerhayes n. sp.

Travancore on Amaimudi slopes; 7,500 ft. (Barnes 629).

Affinis *H. Perrottetianae*, A. Rich., a qua floribus minoribus, labello fere ad basin tripartito portionibus aequilongis intermedio lineari-oblongo acuto lateralibus anguste lanceolatis, calcar brevius differt.

For the last 4 lines of **p. 1077**, and the first 3 of **p. 1078**, substitute:

Panicles short, subsessile, much shorter than the uppermost leaves; fruiting pedicels decurved:—

Stem stout, erect, 8—36 in. high; roots long, fibrous; leaves broadly elliptic or elliptic-lanceolate, acuminate or caudate-acuminate, narrowed into the petiole, puberulous or glabrescent, 3—6.5 in. long, 1—2 in. wide; sheaths glabrous or pubescent, mouth usually ciliate, .6—1.3 in. long; panicles pyramidal; fertile stamens 2; capsules globose, .2—2.5 in. diam.; seeds reticulate.....18. *ovalifolium*. Stem sometimes creeping below and rooting, erect portion up to 20 in. high; leaves ovate-lanceolate, long-acuminate, base narrowed, glabrous; sheaths glabrous or nearly so, .8—1.2 in. long; panicles terminal and among the cluster of leaves, compact, not pyramidal; fertile stamens 3; capsules subglobose, olivaceous, glistening when dry; seeds with deep angular pits in 4 rows separated by prominent zigzag ridges.....18a. *Hallbergii*.

p. 1079, after line 33, insert:

18a. *ANEILEMA HALLBERGII*, Blatt. in Journ. Bomb. Nat. Hist. Soc. xxxiii, 74.

Gersoppa Falls (Hallberg & McCann).

Corolla pale-lilac or whitish; filaments of the fertile stamens: 1 long, stout, purple; 1 shorter, purple; 1 still shorter, white.

p. 1082, for lines 14—8 from the bottom, substitute:

Epiphytic, subscapigerous; flowering stems numerous, slender, 3—10 in. long, rooting below, viviparous at apex; leaves radical and cauline, more or less pilose with rufous hairs, the former linear to linear-lanceolate, 1—5 in. long, .2—4 in. wide, cauline shorter and wider; flowers solitary, twin or 3—4 in an umbel; sepals villous:—

Cauline leaves ovate or elliptic, acute, .2—75 in. long; flowers 2—4 in an umbel on a capillary pilose peduncle, 2-bracteate; petals connate to the middle; filaments naked; capsules oblanceolate, .1 in. long, rufous-hairy; seeds cylindric, smooth.....2. *vivipara*.

Cauline leaves elliptic-oblong, acute, appressed-hairy above, hairs below spreading; flowers solitary or twin; petals free nearly to the base; filaments densely bearded with white, moniliform hairs; capsules cylindric, obtusely trigonous, .14 in. long; seeds sub-cylindric, smooth.....3. *epiphytica*.

p. 1083, after line 3, insert:

3. BELOSYNOPSIS EPIPHYTICA, C. E. C. Fischer n. comb. *Cyanotis epiphytica*, Blatt. in Journ. Bomb. Nat. Hist. Soc. xxxiii. 76.

Above Gersoppa Ghát (Hallberg).

An almost stemless herb. Flowers white.

p. 1099, for lines 25—30, substitute:—

Rhizome stout, up to 2 in. diam.; leaves usually acute at both ends, usually large, veins very numerous, ascending, slightly curved; petioles about as long as to considerably longer than the blades; stipular sheaths acuminate, 2-keeled, up to 7·5 in. long:—

Cataphylls 6—13·2 in. long; leaves oblong-acuminate, 6—22·5 in. long, 1·8—7·5 in. wide; petioles 5·2—42 in. long; peduncles 5—8·4 in. long; spathes narrowly turbinate, 2—10 in. long, strongly twisted upwards, tapering to a subulate tail 1·4—1·8 in. long, dark-purple, smooth below, warted or rugose above.....1. *ovata*. Cataphylls 2·3—5·4 in. long; leaves elliptic- to ovate-lanceolate, acute or sub-acute, 4·4—8·4 in. long, 1·6—3·6 in. wide; petioles 2·4—12 in. long; peduncles 1·2—2·2 in. long; spathes cylindric oblong, usually slightly constricted above the chamber, 1·6—2·3 in. long, 6—8 in. diam., abruptly contracted into a slender, S-curved tail 3·4—5·4 in. long, .05—0·8 in. diam., flesh-coloured or brownish-buff with 5 longitudinal purple stripes below, not contorted, quite smooth or sometimes very slightly warted and hispidulous above the middle

1a. *toxicaria*.

Line 13 from the bottom, delete "*L. toxicaria*, Dalz." At end, add: in part.

After line 9 from the bottom, insert:

- 1a. LAGENANDRA TOXICARIA, Dalz. *L. ovata* Thw.; Fl. Madr. 1576 in part. Travancore; 1,000 ft. (Barnes).

Resembling *L. ovata* Thw. in the vegetative parts and *L. Meeboldii* C. E. C. Fischer in the spathes.

p. 1105, for lines 7 and 8, substitute:

Limb of spathe expanded:—

Appendage of spadix clavate at apex, not stipitate; neuters present:—

Apex of appendage smooth or at most muriculate:—

For lines 25—29, substitute:

Apex of appendage convolutedly tubercled. Leaflets 7—15, sessile, narrowly oblanceolate, 5—12 in. long, .9—3·5 in. wide, finely caudate-acuminate, sometimes the tail filamentous and up to 2 in. long, nerves numerous; petioles up to 26 in. long; spathes 3—6·4 in. long, limb ovate, ending in a pendant, filamentous tail 1·6—6·8 in. long; spadix cylindric, terminated by a subglobose or clavate, convoluted knob 3—6 in. diam.....3a. *tuberculatum*.

Appendage narrowed to the apex, not clavate, at most ending in a very small knob:—

Leaflets 5, sessile or the middle one very shortly petiolulate, elliptic-ovate to -obovate, 1—4 in. long, .5—2 in. wide; limb of spathe ovate-boat-shaped, tapering into a filamentous tail 2—4 in. long; dioecious; neuters 0; appendage shortly stipitate, abruptly swollen at the base and then tapering to a blunt point, recurved in the upper half.....4. *Wightii*. Leaflets usually 7, sometimes 5, all distinctly petiolulate; appendage not stipitate, not abruptly swollen at the base:—

Spathe 3·4—4·4 in. long, limb horizontal, dark-purple, tapering into a filiform tail .3—1·3 in. long, sometimes ending in a small knob. Leaflets elliptic-lanceolate, acuminate at both ends, 3·2—6 in. long, .9—1·9 in. wide, margins entire; spadix straight, narrowly fusiform, tapering into a short tail terminated by a minutely warted small knob.....4a. *Barnesii*. Spathe 1·6—2·8 in. long, limb overarching, bright-green, abruptly narrowed into a filiform tail .3—8 in. long, upcurved at the apex and ending in a small spherical or clavate knob. Leaflets elliptic-lanceolate to -oblanceolate,

acuminate or caudate-acuminate, base acute, 2—10.5 in. long, .66—3.6 in. wide, margins erose; spadix nearly cylindric, narrowed and curved near the apex, ending in a small minutely warted knob; dioecious or the ♀ with a few anthers intermixed; a few, sometimes forked, neuters above the ♀

4b. *tylophorum*.

Limb of spathe cucullate, leaving only a narrowly cordate opening. Leaflets 9—11, sessile, narrowly elliptic-oblongate, finely acuminate, base tapering, 3.6—5.4 in. long, .7—1.2 in. wide, margins erose, revolute; spathe 2.4—2.7 in. long, bearing a terminal, filiform tail 1—1.2 in. long; ♂ spadix fusiform, of the ♀ subulate, both obtuse; a few neuters present above the ♀.....4c. *translucens*.

After line 4 from the bottom, insert:

- 3a. *ARISAEMA TUBERCULATUM*, C. E. C. Fischer in Kew Bull. 1925, No. 2, erratum to p. 167. *A. convolutum*, C. E. C. Fischer non Nakai in Kew Bull. 1934, 167.

Nilgiri Hills; 7,000—7,500 ft. (Barnes).

Tube of spathe white, limb purple with 5—7 white bands tapering to the apex; spadix cream-coloured.

4. *ARISAEMA WIGHTII*, Schott; F. B. I. vi. 507 in part; Fl. Madr. 1585 in part.

Nilgiri Hills; 6,000—7,000 ft. (Wight, King, Barnes).

Petioles and peduncles pale-green; spathe bright-green with 5 white vertical streaks and some fine lines, the apical half of the tail black; spadix white below, purple above.

- 4a. *ARISAEMA BARNESII*, C. E. C. Fischer in Kew Bull. 1933, 342. *A. Wightii*, Schott in Fl. Madr. 1585 in part.

Nilgiris, 6,000 ft. (Barnes); Biligirirangans, 5,000 ft. (Fischer); Coimbatore Anamallais, 3,300 ft. (Fischer).

Tube of spathe vertically striped with dark-purple and whitish bands, limb dark-purple streaked outside with green; spadix dark-purple or pale below and dark at apex.

- 4b. *ARISAEMA TYLOPHORUM*, C. E. C. Fischer in Kew Bull. 1933, 346.

A. Wightii, Schott in Fl. Madr. 1585 in part.

Nilgiris; 6,000 ft. (Viscount Gough, Barnes).

Petioles and peduncles light-green marbled with brownish-pink; tube of spathe white with vertical purple stripes within.

- 4c. *ARISAEMA TRANSLUCENS*, C. E. C. Fischer in Kew Bull. 1933, 344.

Nilgiris; 6,000 ft. (Barnes).

Petioles and peduncles pinkish-purple with brown and pink markings or pink with brown and whitish markings; tube of spathe white with vertical green and purple lines, limb with 6 broad purple bands converging at the apex, translucent between the bands; spadix green with faint purple lines, the apex pure white.

p. 1165, for lines 16—19, substitute:

Spikelets terminal, single, .5—.57 in. long; style 3-fid:—

Stem slender, .2—3 in. high, compressed-triquetrous, base slightly swollen and enclosed in sheaths; leaves a little shorter; spikelets linear-oblong, 5—6-flowered, the 1—2 basal florets ♀; glumes broadly oblong, subobtusate, pale-ferruginous, margins broadly hyaline.....1. *Christii*.

Stem capillary, 8—12 in. high, obscurely triquetrous, not swollen at base; leaves a little shorter, filiform, canaliculate; spikelets at first oblong, later ovate, many-flowered, the 6—12 lowest florets ♀; glumes ovate to subrotund, obtuse, often emarginate, reddish.....1a. *rara*.

p. 1168, after line 24, insert:

- 1a. *CAREX RARA*, Boott; F. B. I. vi. 713.
Ootacamund; 7,000 ft. (Barnes).

p. 1175, after line 10, insert:

Spikes solitary or twin, rarely 3-nate; glumes chartaceous or thinly coriaceous, smooth:—

After line 13, insert:

Spikes corymbose, rarely reduced to 1—3; glumes thickly coriaceous, strongly transversely ribbed or rugose.....21a. *THELEPOGON*.

p. 1180, in line 17 from the bottom, after "lemmas" add ":—" and in line 16 from the bottom, delete "117 GLYCERIA."

After line 17 from the bottom, insert:

Lemmas membranous with broad hyaline tips, broadly oblong, back rounded; perfect florets 7—12.....117. *GLYCERIA*.

Lemmas coriaceous throughout, boat-shaped, keeled; perfect floret 1.
117a. *EHRHARTA*.

p. 1196, after line 14 from the bottom, insert:

21a. *THELEPOGON*, Roth.

Coarse, perennial herbs. *Leaves* lanceolate. *Racemes* few to many, corymbosely fascicled, rarely reduced to 1—3; rhachis flexuous, fragile, joints thick, more or less deeply excavated. *Spikelets* ovoid, one sessile at each node accompanied by a coriaceous, flat, curved pedicel devoid of spikelet. *Glumes* 2, thickly coriaceous, beaked, transversely strongly ridged, rugose or tubercled; upper sunk in the cavity of the joint, 2-flowered. *Lemmas* and *paleas* hyaline; lower nearly as long as the glume, lanceolate, its palea shorter and enclosing usually a ♂ floret; upper 2-cleft to the middle with a long geniculate, twisting awn from the sinus, its narrow palea enclosing a bisexual floret. *Lodicules* 2, broadly cuneate. *Stamens* 3. *Styles* 2, free. *Grain* narrowly oblong, free.

THELEPOGON ELEGANS, Roth.; F. B. I. vii. 148.

Hyderabad State at Ellora (Ralph).

Culms 1—3 ft. high, branched from the base; leaves lanceolate, cordate, amplexicaul, 3—10 in. long, 3—75 in. wide, hispid with hairs from tubercles or nearly glabrous, margins ciliate; racemes 1—2 in. long, joints of rhachis 22 in. long, pedicels 29 in. long; glumes 25—27 in. long; awns 7—1 in. long.

p. 1199, for lines 4—9, substitute:

Culms simple or sparingly branched, up to 4 ft. high, usually slender; nodes usually densely, often long bearded:—

Panicles contracted, rarely somewhat lax; leaves acute; callus of sessile spikelets densely villous, lower glumes 1—14 in. long, usually villous all over or only below the middle; awns 4—9 in. long; lower glume of pedicelled spikelets 14—17 in. long.....2. *Huegelii*.

Panicles with widely spreading branches; leaves setaceous acuminate; callus of sessile spikelet shortly bearded, lower glumes 11 in. long, scaberulous or slightly hairy on the inflexed margins longitudinally slightly depressed along the median line; awns 6—7 in. long; glumes of pedicelled spikelets 11 in. long.....2a. *parviflorum*.

p. 1199, after line 22, insert:

2a. *CAPILLIPEDIUM PARVIFLORUM*. Stapf. *Andropogon micranthus*,
Kunth; F. B. I. vii. 178.

Horsleykonda (Roscoe Allen).

At the end of p. 1280, insert:

117a. *EHRHARTA*, Thunb.

Annual or perennial herbs. *Leaves* narrow, flat. *Panicles* narrow or more or less expanded. *Spikelets* laterally compressed, pedicelled; rhachilla disarticulating between the persistent glumes and the lemmas, sometimes shortly produced. *Glumes* 2, very unequal, membranous. *Lemmas* 3, cartilaginous or coriaceous, boat-shaped, keeled, longer than the glumes, the 2 lower empty, the uppermost containing a bisexual floret; palea narrow, keeled. *Lodicules* 2. *Stamens* usually 6. *Styles* 2, distinct. *Grain* elliptic, much compressed; embryo about $\frac{1}{3}$ as long.

EHRHARTA ABYSSINICA, Hochst.

Nilgiris (Schmid).

Culms slender, 1—3 ft. high; leaves up to 1 ft. long; $\frac{1}{3}$ in. wide; panicles spike-like, up to 6 in. long; lower glumes $\frac{1}{2}$ in. long, acute, 5-nerved; upper $\frac{1}{6}$ in. long, obtuse, 7-nerved; lemmas $\frac{1}{2}$ — $\frac{1}{5}$ in. long, scabrid, the upper empty one minutely tuberculate, often transversely corrugate in the upper half, narrowed at the base into a false pedicel sulcate on the back, the uppermost lemma with a small basal tubercle on each side; stamens 6.

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N.B.—Names occurring two or three times on the same page are indicated by (2) or (3). Non-Indian names are in italics.

It must be remembered that there is no definite standard for the spelling of the vernacular names; many have been taken from old herbarium sheets and the spelling is more or less phonetic.

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